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Cutting Costs in a Drop Forge Shop

Trolley System Used for Handling Work Between Hammers and Furnaces—Features Include Water Reclaiming Plant

BY F. L. PRENTISS*

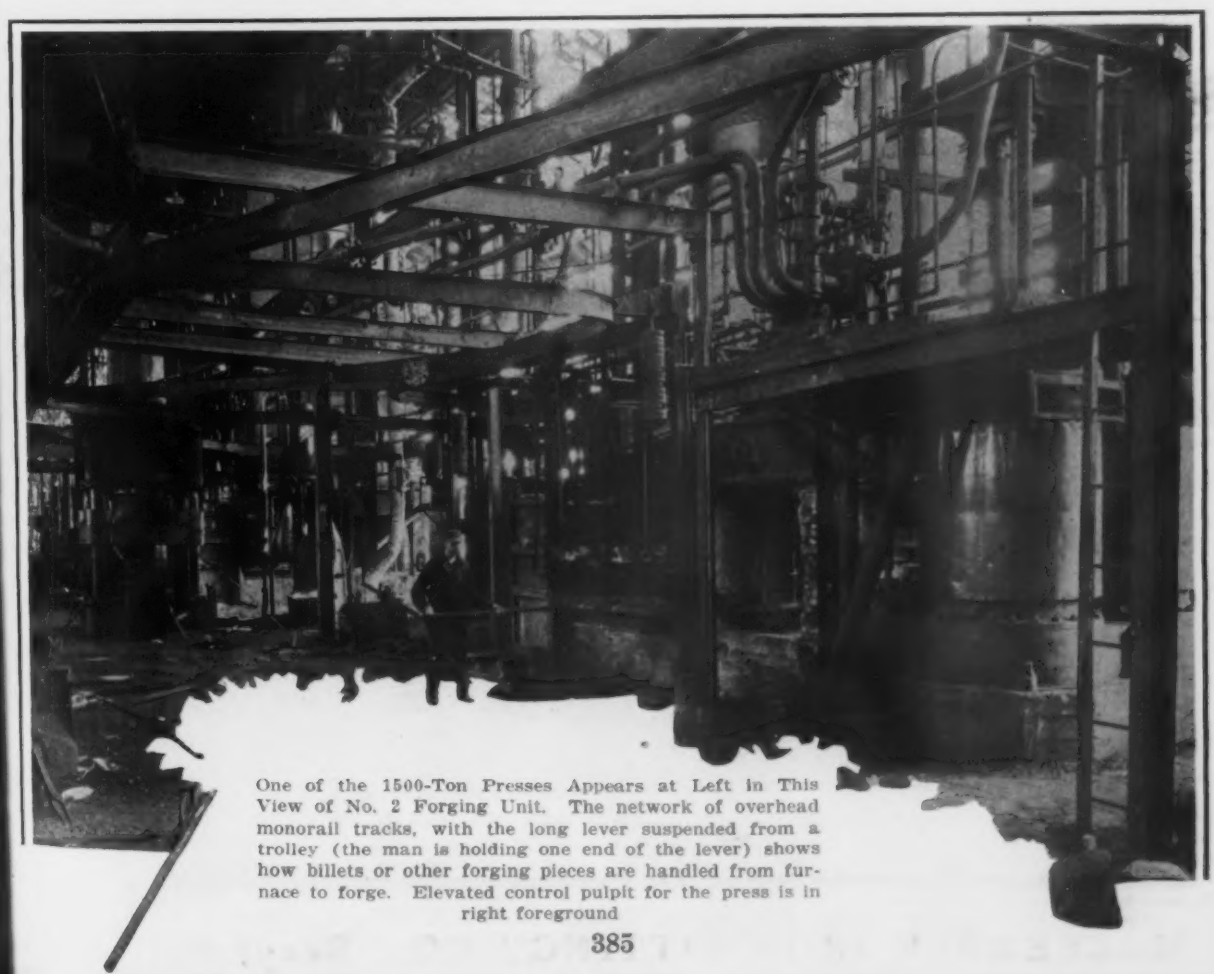
THREE separate adjoining forging units, each unit having two heating furnaces connected to waste-heat boilers, and the units arranged with monorail tracks located in front of the hammers, presses and furnaces for handling work in process of manufacture, form the predominating features of the new drop forge plant of the Champion Machine & Forging Co., Cleveland. While the three units were designed particularly for forging large crank shafts, they can be used for any commercial work in the larger forgings. They were laid out and provided with the monorail system to conserve labor, permit quicker handling of work from furnace to hammer, and to secure the maximum production from a given amount of forging equipment.

The units are so arranged with the monorail tracks reaching from one to another that, should the operations require moving the work from one unit to another, this can be done readily by transferring it to the monorail in the adjoining unit. In forging crank shafts, successive operations are performed in the three units.

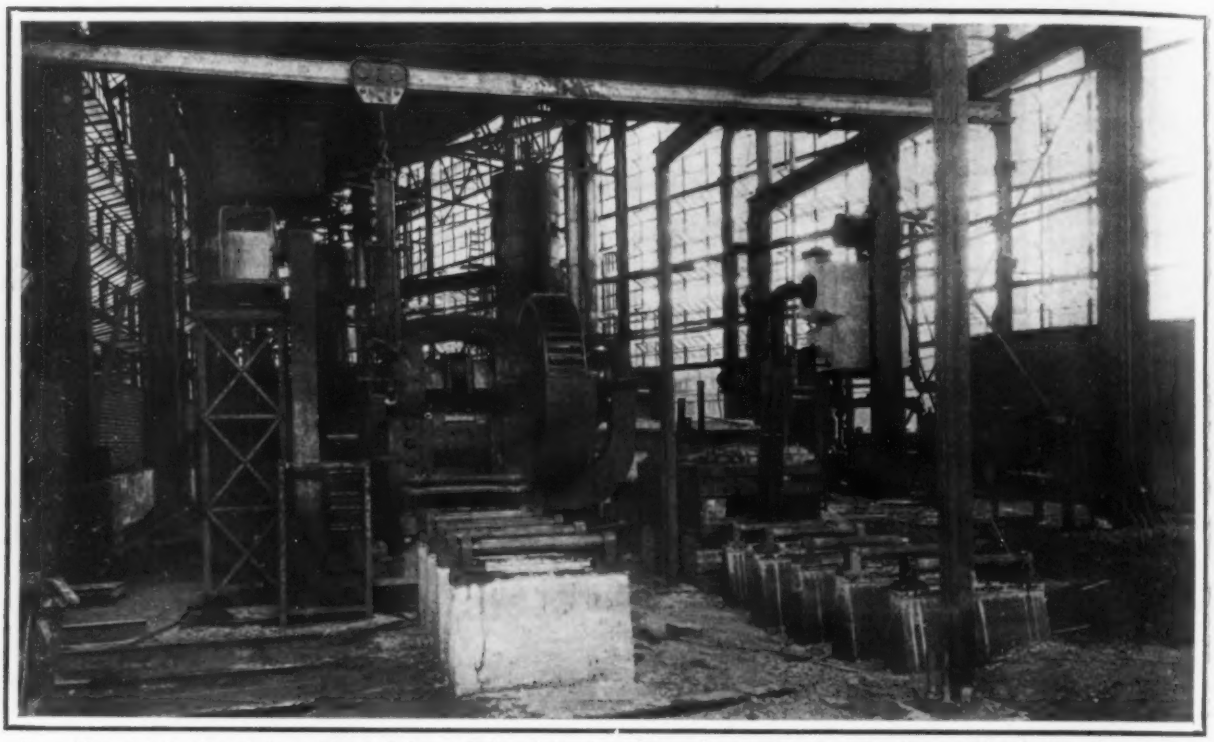
Each monorail unit has a number of hand-operated trolleys from which a carrier is suspended, this being a long lever attached to the trolley by a chain. The work is moved between furnace and hammer on the lever, being guided by a pair of tongs. Only two men are required to handle the piece, the heater and the hammer man, one to push the trolley and the other to handle the tongs. The use of the trolley permits the hammer man to swing the work around in place under the hammer without doing much walking. The trolley rests on an 8-in. 18-lb. trolley I-beam, the top of which is 12 ft. above the floor. The monorail and carriers were supplied by the Richard Wilcox Co.

Waste heat from the heating furnaces is utilized

*Resident editor of THE IRON AGE, at Cleveland.



One of the 1500-Ton Presses Appears at Left in This View of No. 2 Forging Unit. The network of overhead monorail tracks, with the long lever suspended from a trolley (the man is holding one end of the lever) shows how billets or other forging pieces are handled from furnace to forge. Elevated control pulpit for the press is in right foreground



Raw Material Is Handled on These Rollers, Either into the Shears in Center or into the Small Heating Furnace at Right of Shears. The traveling crane places stock on the rack in left foreground, and the air hoist shown on monorail deposits it on the rollers

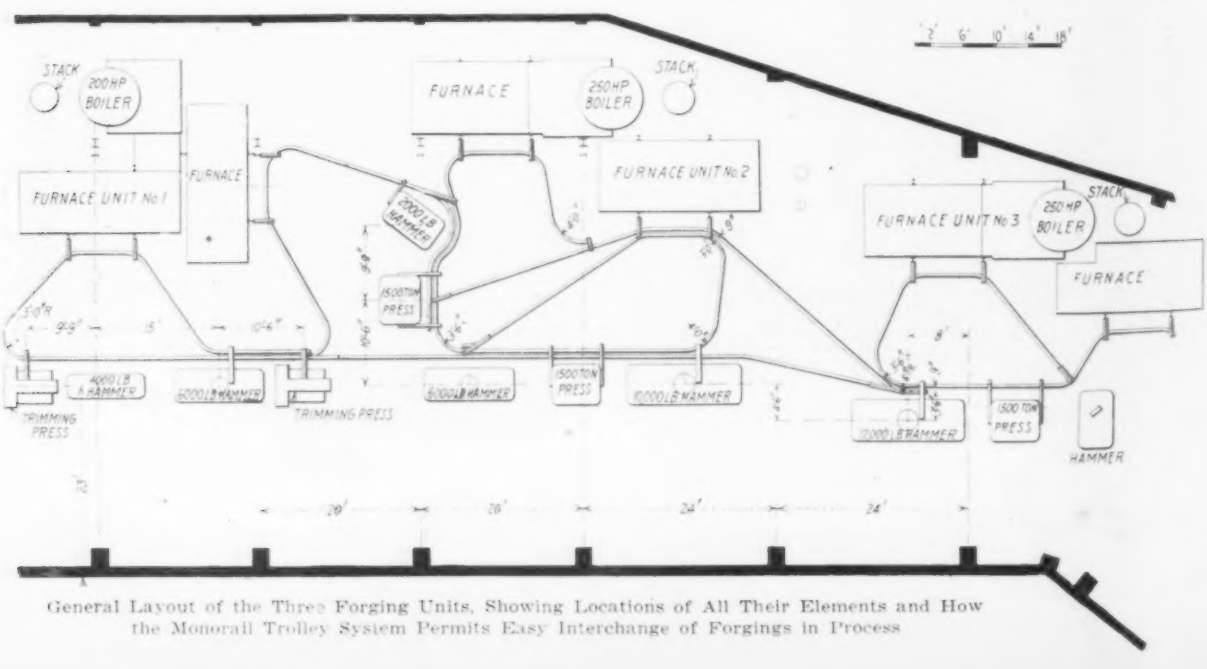
to supply steam for the plant through the waste-heat boilers. Each unit has two furnaces connected to a Wickes standard waste-heat water tube boiler. One is a 200-hp. boiler and the others are 250-hp. each. The forging equipment for the most part is located in a straight line, but an irregularity in the building line required somewhat of an irregular arrangement of the furnaces. The two furnaces are located on opposite sides of each boiler.

Limited space made it impossible to connect all the furnaces directly to the boiler setting. Three are direct connected, but for the other three it was necessary to use underground connecting flues. The flues are carried in a straight line and discharged directly into the boilers. Each boiler has a self-supporting steel stack extending up through the roof of the building and held in a saddle trussed to the building columns, eliminating the use of guys. Two stacks are 120 ft. high and 46 in. in diameter, and the third is 110 ft high and 42 in. in diameter.

Though the heating furnaces, which were designed by the company, are normally oil fired, they are also arranged for coal firing. They have water-cooled welded steel plate doors, and the arch supports and jambs are also water cooled, the latter being provided to protect the buckstays. The use of a water-cooling system is a departure from the usual practice in a forge shop heating furnace.

All furnaces have wide openings, only 1 ft. in height, and split doors. The two furnaces of No. 1 unit have hearths 5 ft. 3 in. wide and 7 ft. 6 in. long, and the other four furnaces have hearths 6 ft. 6 in. wide and 8 ft. long. The water-cooled doors were designed by the Blaw Knox Co. to fit the type of furnace used.

After the furnaces had been placed in operation and it was found that the water cost was excessive, water reclaiming equipment was installed which, it is stated, has resulted in a net saving of $10 per day, after deducting the cost of maintenance. The water



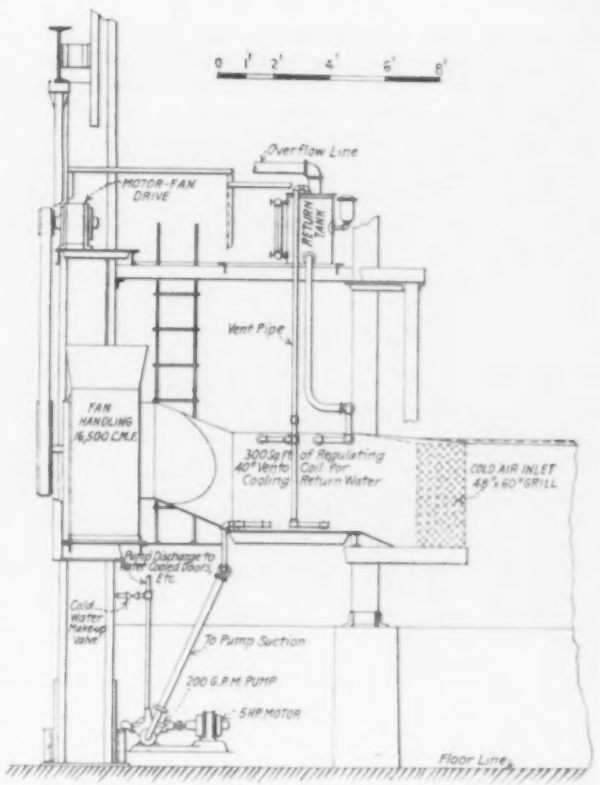
General Layout of the Three Forging Units, Showing Locations of All Their Elements and How the Monorail Trolley System Permits Easy Interchange of Forgings in Process

is carried in five individual discharge lines, ranging from ¾ in. to 1¼ in. in diameter, from the water cooled parts of each furnace, there being two lines from the doors, two from the jambs and one from the arch. These lines discharge through a gooseneck into a sheet metal funnel and from the funnel into a 6-in. open line located 18 ft. above the floor and running the length of the waste-heat plant. Discharge into the main line through the funnel is provided, so that it can be readily seen by glancing into the funnel whether the water is circulating properly through the water-cooled units.

The 6-in. line connects through an automatic feed to a Cochrane feed water heater of 2000-hp. capacity located near the waste-heat boilers, and approximately 200 ft. from the main power plant. The feed water heater was placed in the new forge shop because the company contemplates the erection of a new power plant on a site across the street from the new forge shop.

Surplus hot water, not utilized through the feed water heater, is delivered to the water reclaiming plant, and if the supply is beyond the capacity of the reclaiming plant it passes into the sewer. The discharge from the 6-in. line is into a small tank provided with a water level regulator. From this tank the hot water is circulated through 450 sq. ft. of cooling coils, and from the coils a motor-driven re-circulating pump delivers it into a 3-in. line which carries it back to the water-cooled parts. The coils have a capacity for cooling 200-gal. of water per min., by passing over 16,000 cu. ft. of air per min.

With the elimination of a feed water heater in the power house, an economizer will be installed in each boiler setting to boost the temperature of the entering feed water from the feed water heater. The waste-heat boilers discharge into the main steam lines, there being an automatic cutout on each boiler to shut off the boiler from the steam line when not in use. The connection between the boilers and the main steam lines is through a 10-in. overhead main connecting to the three boilers, and two 10-in. drop lines that extend down to the steam lines located in tunnels under the forge shop floor. The main steam line and exhaust



Arrangement of the Water Reclaiming Equipment, Showing Method of Handling the Water

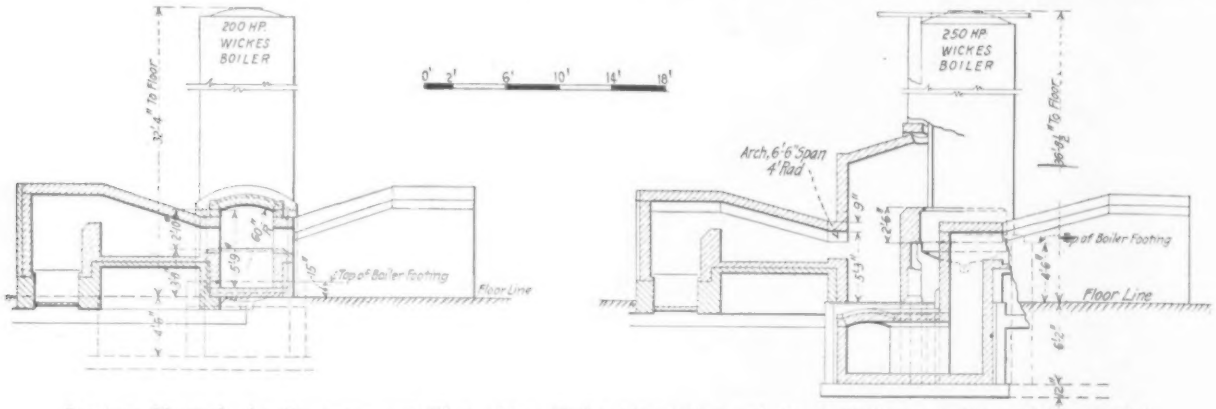
lines are looped together in the tunnels, so that any part of the forge shop can be shut down without affecting the other parts.

No. 1 forge shop unit has a 4000-lb. and a 6000-lb. steam hammer and two electrically driven mechanically operated Toledo trimming presses. Unit No. 2 has two 1500-ton Southwark hydraulic presses and a 6000-lb. Chambersburg and a 10,000-lb. Niles hammer. The third unit is equipped with a 12,000-lb. Niles hammer and a 1500-ton Southwark press, space being provided for a second press. Between No. 1 and No. 2 units is a 2000-lb. blacksmith hammer and a smaller hammer

In This View of No. 2 Forging Unit All Five of Its Forging Elements Appear. At left is the 10,000-lb. hammer; next is a 1500-ton press; beyond, and largely hidden by the press, is the 6000-lb. hammer. In the central background is the second 1500-ton press—the same one showing in another view; at the right is the 2000-lb. blacksmith's hammer. At left of the second press, and beyond it, appears the trimming press of No. 1 unit

is located in the No. 3 unit. In addition to the regular carriers for handling material between the furnaces and press and hammer equipment, the monorail is provided with two chain hoists for handling billets during the operations at the blacksmith hammers .

All the hydraulic presses are operated by two Southwark steam hydraulic intensifiers connected together. One is a high-pressure intensifier that operates the presses at 3800 lb. per sq. in. water pressure, giving 1500 tons pressure on each press for forging work.



Sections Through the Furnaces and Waste Heat Boiler Connections of No. 1 Unit (at Left) and No. 2 Unit

The low-pressure intensifier provides 850 lb. per sq. in. water pressure, giving 300 tons pressure for trimming and bending operations. The intensifiers, which take the place of a pump and accumulator, also do away with the necessity of high-pressure water operating valves at the presses, the valves being located at the intensifier and operated only at low pressure. One man in a pulpit at the intensifier operates all the presses.

Built in 1918 and adjoining the company's old plant, the first unit of this plant was 160 ft. long and 54 ft. wide. Later this was extended 160 ft. with a 15-ft. leanto in the extension for the waste-heat boilers. The steel frame-work of the building is carried 152 ft. further to cover the steel yard, which is served by a railroad switch track. This steel yard extension provides a runway for a 10-ton Niles alternating current electric traveling crane, equipped with a direct current lifting magnet which serves the steel yard and the lower part of the forge shop. A motor generator set mounted on the crane supplies current for the magnet.

The plant is conveniently arranged for the handling of material. Heavy stock is unloaded from cars with the traveling crane and stored out in the steel yard, or on shear racks built of 8-in. I-beams embedded in a concrete base and raised far enough to permit the placing of a crane hook under the stock. From the racks it is picked up with an air hoist with a capacity of 1000 lb. and placed on a set of four steel pipe rollers 33 in. wide, 4 in. in diameter and on 30-in. centers. These rollers are located in front of a Cleveland shear, having a capacity for cutting stock up to 5½ in. square.

Other racks are provided for alloy steel, and near these racks is an oil-fired heating furnace for heating alloy steel bars. A similar set of rollers is provided in front of the furnace for handling bars.

Owing to an angle in the building, two overhead cranes are required, a jib crane serving to transfer between the two sections. One of the traveling cranes serves an inside shipping platform at the end of the plant farthest from the stock yard. This is a motor truck platform used for handling both stock and outgoing forgings. In addition to the use of overhead cranes, electric trucks operating on concrete runways 8 ft. wide throughout the building are provided for distributing and collecting stock and finished forgings.

Blast for the furnaces is provided by three Sturtevant blowers that deliver air at a pressure of 12 oz. per sq. in., and a General Electric high-pressure blower providing a pressure of 2 lb. per sq. in. The Sturtevant blowers are connected to a header, from which blast lines are gated so that the system can be operated on any one of the blowers. The blowers are located in the basement in the center of the building, the blast lines being carried in tunnels under the forge shop and in the leanto that houses the waste-heat boilers.

The forge shop, of steel and glass construction, is unusually high, being 52 ft. to the peak of the roof, which is of the Pond truss type. The windows are of ribbed wire glass. Nearly all the window sections are set in chain-operated swinging sash, that can be set at any desired angle, depending on weather conditions, thus providing good natural ventilation.

Steel Corporation's Orders Decrease

Unfilled orders on the books of the United States Steel Corporation July 31 were 4,830,324 tons, compared with 5,117,868 tons on June 30. This is a decrease of 287,544 tons and compares with one of 364,619 tons in June, 362,737 tons in May, 439,541 tons in April, 649,102 tons in March, 639,297 tons in February and 574,958 tons in January, and represents the twelfth consecutive monthly decrease reported. The unfilled tonnage a year ago was 11,118,468 tons, or 6,288,144 tons more. The table below gives the unfilled tonnage at the close of each month, beginning with January, 1918:

	1921	1920	1919	1918
Jan. 31	7,573,164	9,285,441	6,684,268	9,477,853
Feb. 28	6,933,867	9,502,081	6,010,787	9,288,443
Mar. 31	6,284,765	9,892,075	5,430,572	9,056,404
Apr. 30	5,845,224	10,359,747	4,800,685	8,741,882
May 31	5,482,487	10,940,465	4,282,310	8,337,623
June 30	5,117,868	10,978,817	4,892,855	8,918,866
July 31	4,830,324	11,118,468	5,578,661	8,883,801
Aug. 31	.....	10,805,038	6,109,103	8,759,042
Sept. 30	.....	10,374,804	6,284,638	8,297,905
Oct. 31	.....	9,836,852	6,472,668	8,353,293
Nov. 30	.....	9,021,481	7,128,330	8,124,662
Dec. 31	.....	8,148,122	8,265,366	7,379,172

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

Fire Brick Production Increases

Figures of the United States Geological Survey show that the 1920 production of fire brick amounted to 1,131,000 thousands, as compared with 943,942 thousands in 1919. The 1920 production was valued at $52,750,000, or an average of $46.64 per thousand; the 1919 production was valued at $36,170,000, or an average of $38.32 per thousand. The quantity shows an increase of 20 per cent during the year; the value an increase of 46 per cent and the unit value an increase of 22 per cent. In each year the total value of the product was approximately 20 per cent of the total value of all brick and tile manufactured in the United States.

Beginning Aug. 15 the open-hearth department of the National Malleable Castings Co.'s plant at Sharon, Pa., started on a five-day-a-week basis, instead of three days a week. Other departments will continue to run three days each week.

VANADIUM PRODUCTION IN PERU

Extent of the American-Owned Deposits and Plans for Future Operations

The recently published *Boletin del Cuerpo de Ingenieros de Minas del Peru* gives some interesting data* concerning the important vanadium deposits of Peru, which are American controlled and operated and constitute the chief source of supply of vanadium for the world. The principal deposit, which is at Minasragra and is the only one in active exploitation, has yielded since the beginning of operations in 1907 a total of 27,998 metric tons of ore, having a content of 10,413.6 metric tons of vanadic acid, equivalent to 5850.4 metric tons of metallic vanadium.

Concerning the deposits, the report says: "The great interest awakened in vanadium has resulted in the thorough search for a new deposit in all parts of the world, and there have been developed effective processes for the extraction of vanadium from certain ores in which it is contained in minute percentages. Very little has resulted from these efforts, since there have been discovered no new deposits of importance and the amount of vanadium which has been recovered from other ores by the metallurgical processes referred to does not appear to be important because the processes, while technically successful, necessarily involve a large cost of production. In view of these facts we believe that the vanadium reserves of greatest importance in the world and in Peru are the numerous and extensive deposits of asphaltic material, which exist in the departments of Junin and Lima. These contain from 1 to 2 per cent of V_2O_5. These deposits were the object of interest on various occasions, and in 1908 and 1910 there were exports of ash obtained by burning the asphalt, with a resulting content in the ash of from 20 to 25 per cent of V_2O_5. Later, the depression in vanadium as a consequence of the remarkable developments at Minasragra has caused the suspension of these exploitations except in some few localities near the railroad, which still utilize the vanadium from the ash to a limited extent."

Referring to the Vanadium Corporation of America, the *Boletin* says: "For some time this company has given special attention to the exploration of its mine to determine as definitely as possible the extent of the ore, so that it could plan its work and determine the future of the business. The result of these explorations, which were done mainly by diamond drilling, has been satisfactory and in consequence the company decided to undertake the expensive improvements which are now being made. It was reported that the ore in sight represented about 16,500 tons of metallic vanadium, and it was claimed that the total ore in the mine, based on probable estimate, would exceed 45,000 tons.

"The president of the company at a recent meeting denied certain rumors that had been circulated about the exhaustion of the ore reserves, claiming that on the contrary the engineers had discovered a new vein of ore which increased the reserve very much. In addition to this it was announced that the company was planning an installation for the treatment of the mine waters which carry an appreciable quantity of vanadium, heretofore lost in Lake Punrun, and that the recovery from this source would be equivalent to $500,000 yearly.

"From these facts and reports it appears evident that the reserve at Minasragra are sufficiently large to insure an ample production during many years, especially with the provision of methods and facilities to permit of realizing on the leaner parts of the deposit. As is to be expected, the grade of the ore is not so high as at first when the rich zone of patronite (vanadium sulphide) was being worked. Now the oxide ores preponderate and are extensive in quantity but of lower grade. The sulphide of vanadium ore which was formerly extracted had from 20 to 25 per cent of V_2O_5 and by elimination of the sulphur by calcination it was possible to export a product of from 40 to 45 per cent of V_2O_5. However, in 1919 the average of the exports was only 30.4 per cent, and in 1920 some shipments as low as 16 to 20 per cent were made. Because of these conditions, the company decided to construct at Jumasha, on the shores of Lake Punrun, a beneficiating plant and a furnace, by which it can obtain a product 85 to 90 per cent of V_2O_5, which can be exported to the United States for refining. At first it was planned to treat the ore by lixiviation but, considering the good results obtained by the electrical furnaces at Bridgeville, Pa., it was decided to use instead electrical smelting, and a contract has been made for a 20,000-kw. hydroelectric installation at a place about 40 kilometers from Jumasha.

"In addition to the reserves in the deposit, the company has a large amount of ore already mined which it has not been possible to export before because of the transportation conditions. Formerly the ore was transported on the llamas from the mine to Jumasha, and then across Lake Punrun on barges, and then conveyed again by llamas to the station of Ricran, on the Cerro de Pasco Railroad to La Oroya. The employment of llamas furnished uncertain transportation, and to remedy this a broad gage railroad has been constructed from the mine to the lake, a distance of 12 kilometers. This was finished in 1920. Likewise, an excellent road for automobile trucks was built from the lake to the railroad, a distance of 25 kilometers. Over this road the ore is transported by caterpillar tractors, drawing special trucks which are loaded at Jumasha and transported across the lake on motor barges. This transportation system is adequate for the handling of a thousand tons monthly."

*Translated by Kirby Thomas, New York.

To Replace Chateaugay Furnace at Standish, N.Y.

Contract has been awarded the William B. Pollock Co., fabricating interest of Youngstown, Ohio, for the replacing of a blast furnace, supplying the ladle equipment and making necessary improvements to the stoves and piping by the Chateaugay Ore & Iron Co., Standish, N. Y. The award represents one of the most important blast furnace contracts entered into this year. The blast furnace to be replaced was built and erected 17 years ago by the Pollock company.

The Pollock company will erect the new furnace as well as build it. The ladle cars to be supplied are a new built-up, short-pour type of the Pollock company's own design. Freyn, Brassert & Co., Chicago, designed the new stack for the Chateaugay company, while E. P. Ross, vice-president of the Wharton Steel Co., is in direct charge of the improvements.

Chicago Hearings on Basing Point in September

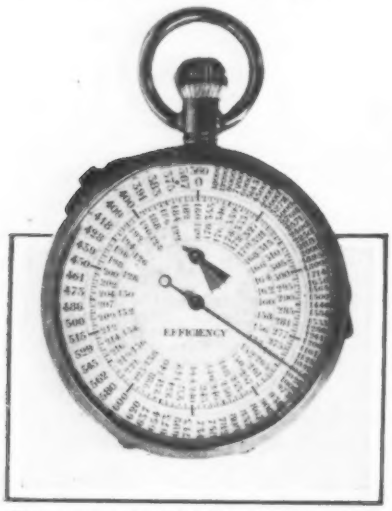
CHICAGO, Aug. 13.—Hearings on the Pittsburgh basing point for steel prices will be opened here in September, according to K. E. Steinhauer, attorney for the Federal Trade Commission, who is in the city investigating the complaint of the Western Association of Rolled Steel Consumers. At these hearings attorneys for the respondents and the complainants, respectively, will introduce evidence. The examiner, after the hearings, will present tentative findings to the commission. The attorneys may then present their objections to such findings and the commission may allow counsel to argue the matter before it both orally and by brief.

Contract is being negotiated for construction of the Youngstown & Austintown Railroad, a four-mile branch of the Erie extending from the Ohio Works of the Carnegie Steel Co. at Youngstown. The purpose is to afford plant sites with rail connections for small and diversified industries. The project is being financed by the New Industries Co. of Youngstown, of which George E. Rose is president. The Erie, it is stated, has agreed to reimburse the builders for the cost of construction by allowing them a certain charge for each car of freight moved over the road.

New Time Study Watch

The duration time study watch shown in the accompanying illustration is a new instrument developed by the Mortimer J. Silberberg Co., 122 South Michigan Ave., Chicago, for use in time and motion study. It is designed to handle the timing, analysis and observation of from one to ten operations, up to and including 5 min. duration.

There are three circles on the dial, the outer one being red; the center, black; and the inner blue. The large hand makes a revolution in 100 sec., the small hand in the center moving over a red, a black and a blue sector to indicate by color the circle in which the large hand is operating. All of the figures on the dial denote production per hour, based on the time of ten operations. For example: If ten operations were observed in 20 sec., the figure under the large hand in the red circle would show 1800 operations per hour. If one operation were observed in 20 sec., then instead of 1800 it would show on the dial 1800 ÷ 10, or 180 operations per hour.



Figures on the Dial Denote Production per Hour, Based on the Time of Ten Operations

If an operation is timed and its duration is 130 sec., it will be noted that the large hand will have made one total revolution and 30 sec. additional. The small hand in the center of the dial will then pass the first sector and show in the second sector, which is the black and which denotes that the operation must be read in the black circle. Then reading under the 30-sec. mark in the black circle the figure 277 will be noted. However, this figure being based on the observation of 10 operations, and only one operation having been timed in that period, it is necessary to point off one figure, and the result is then 27.7 operations per hour, based on one operation timed in 130 sec. The same applies to operations of longer periods; the small hand moves in the colored sector, showing in which circle the large hand is operating, simplifying the calculation of elapsed time.

The instrument has the take-out time feature allowing the operator to start and stop the watch without returning the large hand to zero. When an operation is entirely completed pressing the crown down returns all hands to the starting point. The dial is divided in seconds and half-seconds.

Increasing the Output of Castings in Steel Works

A method of lay-out for steel works whereby castings can be produced practically continuously is described at length by a writer in *Stahl und Eisen*, July 29, 1920, an abstract of which is furnished by *Technical Review*, London, which cites the following advantages:

By subdividing the total casting operations into casting work proper and secondary operations, and transferring these two branches of the work to two separate sets of machines, losses of time, which are otherwise unavoidable, are eliminated, and thus the highest attainable output of castings is obtained. By adopting these measures it is possible to cast 60 heats of 22 tons each, or 1320 tons of steel, in 12 hr.

By making the casting operations as far as possible automatic, the number of hands required on this work can be reduced to seven, and a saving in wages effected which varies according to the circumstances governing each particular case.

Traversing platforms and other equipment details for the transverse motion of the foundry cars, with their ladles, are dispensed with, thus effecting a saving not only in plant charges and space, but also eliminating a source of danger.

The foundry can be made considerably smaller in dimensions, and the floor space thus set free can be used for other purposes in existing steel works. The plant charges can also be considerably reduced in new installations.

Stagnation in Italy

MILAN, ITALY, July 27.—There has been practically no changes in the month. Business is absolutely dead and it is therefore hard to give correct prices. Italy is going through a very hard spell on account of the continual fighting between the Socialists and Fascisti.

Thousands of people are out of work as all firms are laying off help and some have even closed completely. The hotels and summer resorts are begging for guests; this time last year one could scarcely find a room in a summer resort.

Here are this week's prices, largely nominal, in lire, f.o.b. Milan, per 100 kg.:

	May 22	June 30	July 27	Cents Per Lb., July 27
Copper, electrolytic	575	600	630	11.65
Copper sheets	1020	1020	1040	19.24
Brass sheets	900	900	900	16.65
Brass wire	875	875	880	16.28
Brass rods	550	550	560	10.36
Brass tubes	1070	1070	1100	20.35
Black sheets, base, 4 mm.	160	150	160	2.96
Galvanized sheets, No. 20	250	240	235	4.35
Tin plate, standard, per case	189	165	175	$7.14

Stereoscopic Eyepiece for Microscopes

A new eyepiece for use on microscopes is being offered by the Bausch & Lomb Optical Co., Rochester, N. Y. With this eyepiece a stereoscopic effect equal to that given by a binocular can be obtained with a monocular microscope. Among the advantages of binocular vision absence of eye fatigue and the well-defined relief of details which might escape one eye may be mentioned.

The Tops of the Eyepiece Caps Are Adjustable for the Eyepoint of the Eyepiece

The attachment is designed so that the axes of the eyepiece tubes are parallel, permitting the eyes to be used with relaxation of convergence, and hence accommodation, as if they were directed at a far distant object. A prism system mounted in the body holding the two parallel eyepiece tubes divides the pencil of light from the objective into two full aperture pencils, and turning them through 90 deg., reflects one and transmits the other. Since placing the new eyepiece upon the monocular microscope raises the tube length to 230 mm., its extension tube has a negative correction lens to compensate for this increase. The two eyepieces are regularly 6.4 x specially matched for this use, and specially matched 7.5 x eyepieces can also be supplied. The steroscopic eyepiece can be used with almost any monocular microscope.

The Inland Steel Co., Chicago, reduced wage rates, effective Aug. 1. Wages for day and tonnage employees are now the same as those which were in effect May 1 to Oct. 1, 1917. Salaries of employees paid by the month were to be adjusted on an equitable basis, according to the announcement by the company. On July 1, the Inland Steel Co. discontinued the basic 8-hr. day, eliminating time and one-half pay and placing production departments on a straight 10 and 12-hr. basis.

Necessity of Proper Cost Accounting

Machine Rate or Production Center Method Stressed—Distribution of Overhead in Bulk or by Department—Why Some Methods Fail

BY J. B. SEHL*

THE primary purposes of cost accounting may be summarized as follows. 1st. To ascertain actual costs. 2nd. To forecast with reasonable accuracy in order to fix future selling prices. 3rd. To reduce costs. 4th. To increase efficiency. From this we begin to appreciate its importance to the manufacturing, selling and administrative departments of the business.

Elements of Cost Considered

Manufacturing costs are made up of three elements: materials, labor, and manufacturing overhead, or burden as it is often termed. In manufacturing there is another overhead burden which consists of selling and administrative expense, and this also has to be considered in addition to the manufacturing cost, before the final cost can be determined, profits calculated and selling prices established.

In manufacturing there can be no production for marketing without combining material, labor and overhead in some proportion to each other. That is to say, in some industries material may be the important element, its fabrication involving little labor; in other lines of industry, this condition may be reversed, the material being unimportant in value but its conversion into finished product involving a large amount of high-priced labor. But, whatever the conditions may be as regards material and labor, the manufacturing overhead expense or burden is as inevitable as taxes and death, its weight very frequently spells success or failure for the enterprise, and its distribution over the product necessitates the employment of accounting principles which are absolutely dangerous unless properly applied.

Direct or Productive Material

The cost of the material of which the product is composed is usually easy to follow, requiring merely an entry for the amount involved. By arranging suitable facilities for the storage of material and its issuance by requisition for consumption, much can be done not only to facilitate the cost accounting work, but to aid those who have the immediate responsibility for the preparation, planning and execution of factory production.

Stock records, so called perpetual inventories, and stock control of material, whether it be finished or unfinished, is good business conduct for the very good reason that it represents money and should be safeguarded as such. Theft is not the only reason why materials mysteriously disappear; waste, spoilage of work are among other reasons. But, whatever the cause, losses of material increase manufacturing costs accordingly.

Expense of Materials in Overhead

Materials which do not form part of the manufactured product, but are incidental in the manufacturing operations, should also be under stock room control. Frequently, materials of this class are expensive and make up a large proportion of the manufacturing overhead, and their consumption is more difficult to account for than the material which goes into the product.

Direct or Productive Labor

Among the several methods of recording and paying for the performance of labor may be mentioned the premium system, or some modification thereof, the contract method, piece work and day work. Whatever the method, the importance of speed and accuracy cannot be overestimated, because this is where direct contact with the workman is involved, and his time card is his bookkeeping system. It is the score card of his performance and, for this reason, the job time card must be planned to give all the necessary information with the highest possible speed, first to the operator and his foreman and without bookkeeping by them, before the time record is incorporated in the cost records.

What the foreman wishes to know, among other matters in connection with time keeping on job order costs, is the success or failure to accomplish desired production, the earnings made, the quantity of good work produced, how much defective work and the reason therefor. It is evident that this information must be given to him quickly, and also to the workmen. They should have this information day by day and not week by week. The foreman is primarily the executive to whom the workmen look for instruction and the settlement of matters affecting their daily work, time, earnings, etc., and he must be in a position to answer questions quickly and also accurately; therefore, neither his nor their co-operation can be expected with any timekeeping arrangement that is an irritant instead of an assistance.

Operatives who are assigned to what is termed "productive labor" are not always producing. For reasons sometimes beyond their control they are subject to "lost time," due to waiting for work, repairs to tools or machines, waiting for material, etc., and this lost time, unlike materials, cannot be replaced. The time keeping arrangement must account for such losses, and it is possible for the accounting system to incorporate the loss in the schedule of accounts, and indicate the amount.

Non-Productive or Indirect Labor

This class of labor, such as foremen and clerks, inspectors, truckmen, repairmen, has practically the same relation to manufacturing operations as expense material, and must be carefully accounted for and accurately distributed, because it frequently is a large item in the factory burden.

Manufacturing Overhead or Burden

A manufacturing business must provide, among other things, miscellaneous materials, machinery to work with and buildings in which to work. There must be power, light, heat, depreciation and various other items of similar nature, and a factory supervisory organization. The cost of maintaining the above represents what it *costs the company to keep workmen at work;* this is over and above the wages paid them and the material used by them for conversion into the finished product.

An examination of the general factory burden of a typical company would reveal expenses of three general classes: First—Expenditures that do not vary with increase or decrease of production, and known as "Fixed Charges," such as taxes, fire insurance, depreciation and interest on investments. Second—Expenditures that vary to some extent with increase or decrease of production and known as "Semi-Fixed Items," such as factory supervision, cost of operating the purchasing and receiving departments, clerical hire in the factory offices, emergency hospital expense, washrooms. Third—Expenditures the volume of which is in direct relation to volume of production and which

*Billings & Spencer Co., Hartford, Conn. Abstract of paper read before American Drop Forge Association at Chicago, June 24.

are usually termed "Variable Charges," such as yard expense, internal transport, inspection, liability insurance, general equipment, repairs and supplies of various kinds.

After the proper determination and classification of the general burden charges, the next step (and most important) is properly to apportion and distribute it over the producing departments or operations. In a large business, which manufactures and markets a varied product, extreme care must be used so to apportion the general overhead charges as to place each kind of product on a basis which is competitive with another producing these goods exclusively.

As an illustration, a business may comprehend the manufacture of iron castings and the machining and assembling of these pieces into machinery for its own use and also for sale; it may also produce forgings to be sold without further processes and it may also machine and heat treat them. To make the forgings it must provide the proper machine tools and fixtures. With such a variety of activities, those directing the policies ought to know if it is cheaper to purchase the castings than to manufacture. The same applies to the forgings, and the provisions for dies, tools and fixtures must have the same consideration. In determining matters of such vital importance, how is an intelligent decision to be made without proper distribution of expense?

Departmental Burden Assigned Where Possible

It is usual to place machinery performing similar operations in defined groups, as separate from operations of different character. Often an arrangement of this kind is called a department and occasionally referred to as a production center. Irrespective of phraseology, it is apparent that machinery and the work performed by it necessitates operating expenditures that are different from expenditures carried by the operation of machinery on some other class of work. Other classes of work may be what is known as bench work, requiring little or no machinery.

For factory accounting purposes, the procedure then is to "tie up" certain expenditures directly to the operations causing the expenditures, as for example: The replacement cost of drop boards is contingent on the operation of drop board hammers and not on steam hammers, repairs to machinery are not to be expected in connection with bench work operations, fuel oil for the forge department would not be a proper charge to the die-sinking department.

Certain work may necessitate certain immediate inspection before other operations ensue, thereby treating this more directly than the inspection which is of general character. Trucking costs may be more excessive in some departments than in others, and the same with lubricating and cutting oils, supply tools, belting renewals, expense materials, power, etc., and it will be noted that most of these charges which can be applied directly do vary, and are closely related to the volume of activity.

Spreading Expense Items Over Product

Assuming the expenditures representing production burden to have been properly classified and distributed over the producing departments or operations, the next procedure is to "cost" the articles manufactured with an amount truly representative of their share of the burden incident to their manufacture. There are commonly used five methods of diffusing expense over product: 1. The percentage method; 2. Man-hour method; 3. Sold-hour rate; 4. List percentage method; and 5, Machine rate or production center method.

The last named method has as its objective the distribution of manufacturing burden "through the machine" rather than "through the man," as do the percentage and man-hour methods. It is becoming recognized as the most accurate of all the methods of expense distribution, because it is a clearer expression of the charges incidental to a particular process or operation. It comprehends more definitely the outlay to which the business subjects itself in providing the means of performing the particular process, and it reflects this expenditure in an hourly or daily rate that is a service charge to the product for the time it consumes in such service.

For the purpose of establishing machine rates it is practical to classify into groups the machinery performing similar operations and call these groups "Production Centers." Processes which are similar and not performed by machinery can be grouped in like manner and given the same terminology; consequently a "Production Center" can be a classification of any similar productive activity, performed with or without machinery, and should include the auxiliary machinery or equipment immediately essential to its operation.

One principal requirement for the fixing of Production Center rates is the more direct application of indirect expense, and considerable "detective work" is necessary to effect this. Visualizing the activities of a manufacturing plant as a whole, we have discussed the expenditures that are fixed, semi-fixed and those that rise and fall sharply with the volume of production.

In review, it is seen that to determine a machine or production center rate, it is necessary:

1. To classify machines or processes into groups of similar operation.

2. To determine the operating costs of groups for a given period.

3. To determine the operating hours of the groups for the same period.

Operating costs, divided by the operating hours, gives the actual cost per hour.

Predetermined Machine Rates Based on Budget

The basis for predetermined rates is the budget, a means by which income and expenditure are related and regulated. The first essential to the operation of rates, based on budget forecast, is to provide means of constant comparison of actual with estimated figures, for without this constant scrutiny the arrangement becomes haphazardous.

The usual method is to provide a detailed statement for each production center or unit, showing the number of machines in the group, the possible hours and estimated hours of activity and any other facts which will make the statement convenient for reference. On this statement are listed the charges incidental to operation and, if the statement is in columnar form, in the first column is entered their estimated costs for the period and, in the second column, the actual costs for the same period. In the third column can be entered the variance between the estimated and actual expenditures. The credit element to the statement is the burden earned, which comprises the amount that is charged to the product, and we now can compare the earned burden to the estimated and actual expense.

If, on analysis of the statement, there exists an excess of actual over estimated cost, this is caused by higher prices for materials, labor, etc., inefficiency or a decrease in activity. If the estimates are higher than the actual costs, this is caused by lower prices for material and labor, higher efficiency or an increase in activity. Recalling the statement that the production center activity has been fixed at a standard which past experience indicates as attainable under normal conditions, and which, if operated at such a standard, would indicate normal costs of product, then any difference between the estimate and the actual activity indicates increased or decreased production.

Present day conditions are marked by a more than usual effort to discount the future, and it is sound business to fix our prices on the basis of what we believe will be the prevailing costs under near future conditions. We are to do this by analyzing and forecasting manufacturing and other costs, and also by recognizing the fact that present day inventories are worth no more than their replacement value.

If this is an economic truth, then the efficacy of the budget for costing purposes is proved, and the accounting arrangement that fails to provide the facilities for such forecast is inadequate and out of harmony with present day requirements.

Some cost finding arrangements have been unsuccessful because they adhere too closely to the prevail-

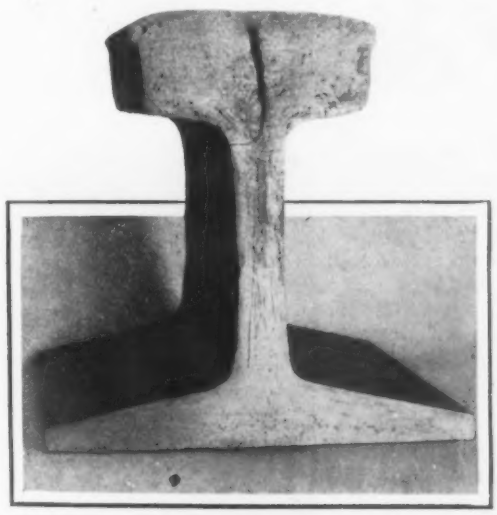
ing idea among accountants that the principal use of cost finding is to fix selling prices. Most important of all, its uses as an aid to executive control is the opportunity for comparison of costs, order by order, or of actual processes with standard process. The absence of this has caused many cost systems to break down in times like the present, and just when the information is needed most.

If a good planning and production follow-up arrangement is already in operation, the cost work is greatly simplified; on the other hand, intelligent cost work can be made a factor in developing a good planning and production system. Unquestionably there is a very close relation between the two which must not be overlooked, and there has been lack of harmony in this respect. Executives are interested in cost work which produces the desired results without interfering with factory activities; so, therefore, the closer the cost finding and the planning and following up of production are co-ordinated, the less will be the impression among shop executives that their duties consist principally of supplying information to the Cost Department.

Split-Head Rail Failure Shows Rupture*

Differs from a Piped Rail and Is Often More Easily Discovered by Outcropping at Side

ON January 3, 1920, the derailment of a passenger train on the Chicago Great Western Railroad, near Wyeth, Mo., resulted in the death of 1 passenger, and the injury of 79 passengers and 3 Pullman employees. The derailment was due to the failure of a rail, the leaving end of which was broken into a number of small fragments. The receiving end, for a length of



End View of Rail, Polished and Etched with Tincture of Iodine, Showing Relations of Markings in Upper Part of Head, and Origin of Split Head Fracture

23 ft. 6 in., remained intact. The type of rupture displayed was a split-head fracture. A vertical plane of rupture was developed which nearly separated the head into halves, which extended along the length of the rail for a distance of 13 ft. Of this section, 9 ft. 6 in. was broken into small fragments, 32 being recovered.

The rail was 85 lb. weight, A. S. C. E. section, rolled in September, 1904, and laid in the track in October of that year. Its age was therefore 15 years 3 months. It was made of Bessemer steel.

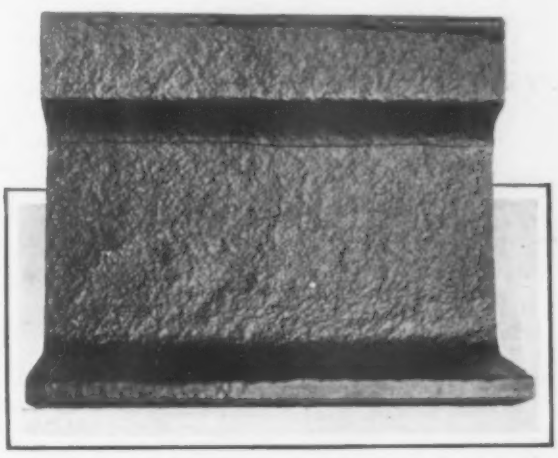
This rail presented a common type of rupture, the characteristics of which are illustrated in the several cuts herewith. In rails with split heads a longitudinal, vertical plane of rupture is developed, located along the middle of the width of the head. The origin of the plane of rupture is an interior one, located about ¼ in., more or less, below the running surface of the head. The shallow zone above the origin of the rupture remains unbroken until the last stages of failure are reached.

In the development of the split head the plane of rupture extends downward until abreast the junction of the head and the web. Here it commonly bifurcates, the branches extending right and left toward the fillets under the head. Final rupture occurs by the complete separation of the halves of the head and their detachment from the web. At the upper initial edge of the plane of rupture a small V-shaped ridge of metal, attached to the upper zone of metal, is frequently found. This acts as a wedge to separate the walls of the fracture.

The incipient point of rupture, in respect to the length of the rail, was somewhere in the 9 ft. 6 in. section, which was broken into small fragments. The characteristics of the metal of the rail were similar along this portion of its length and in the unbroken part adjacent thereto.

One figure shows the appearance of the rail, in cross section, near the fractured portion, after polishing and etching with tincture of iodine. The upper edge of the plane of rupture is characterized by the presence of markings on the end surface revealed by the tincture of iodine. These markings, here viewed on end, represent longitudinal streaks in the steel. They are lines of structural weakness, affecting the metal under crosswise strains.

The split in the head, shown at this stage of development, is much wider at its upper edge than elsewhere. The wedge-shaped rib of metal at its upper edge is forced by the successive wheel pressures between the faces of rupture, thereby increasing the width of the head. The plane of rupture separated below into two branches. One branch extended and reached the periphery of the section at the fillet under the head on the outside of the rail. The other branch extended toward the gage side of the rail, and appears in a partially developed stage.



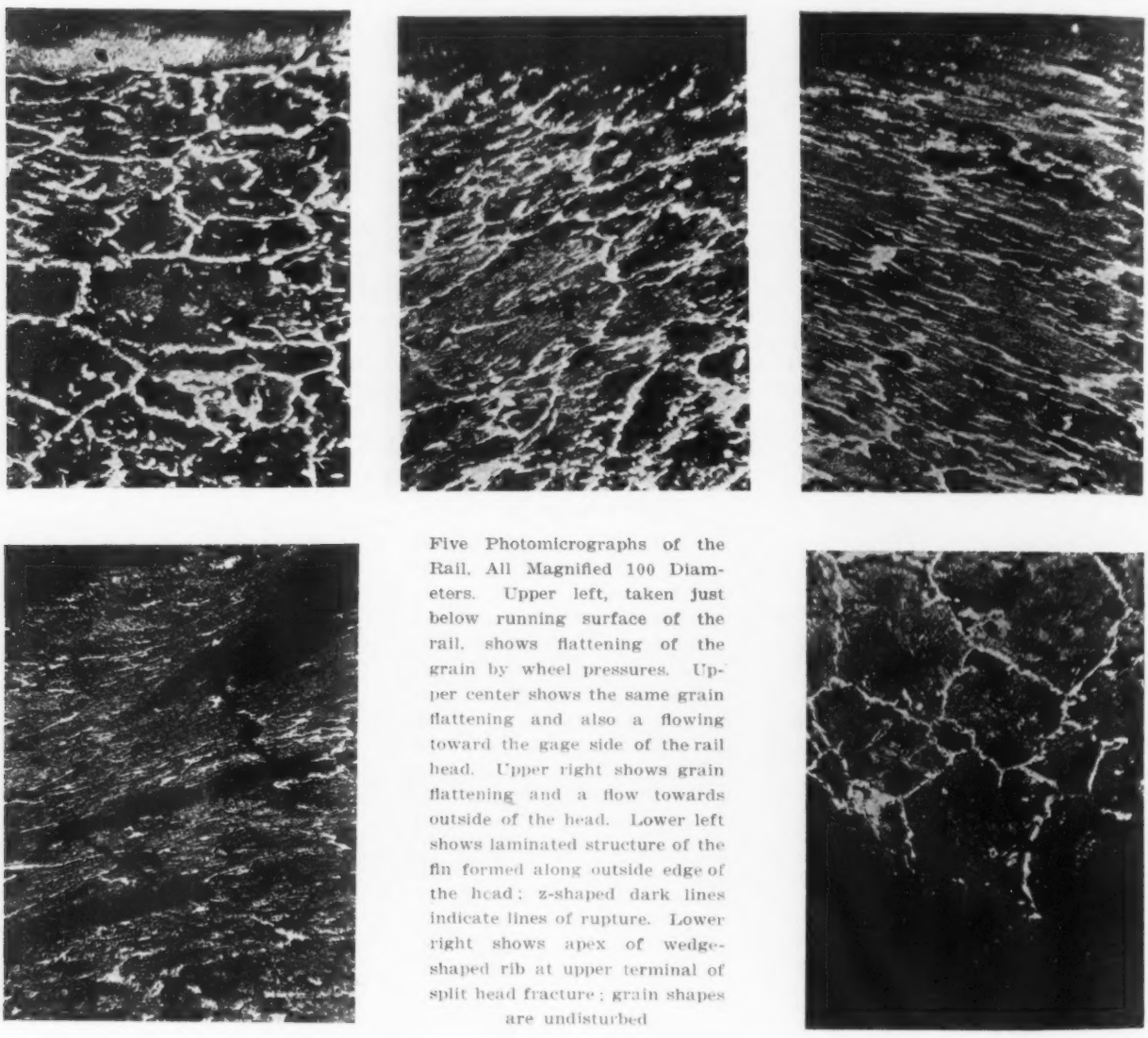
Side View of Rail, Showing Longitudinal Crack at the Fillet Under the Head, Where Split Head Fracture Had Reached the Peripheral Surface of the Rail

In the side view of the rail is shown the line of rupture under the head, which had reached the peripheral surface. Fractures of this kind do not always continue in an unbroken course, but deviate under the influence of contiguous streaks in the metal.

In the study of the failure of steel, attention cen-

*Abstract of report of Dr. James E. Howard, engineer physicist, Interstate Commerce Commission, Washington.

ters upon one principal feature and the relations of subordinate features to the principal one. The principal feature relates to the stress or strain, mutually related factors, which the metal is capable of enduring, and the manner in which limiting values in terms of stress or strain are reached. In plainer language, it is desired to know what loads the steel will carry; what relations the properties of the metal shown under test bear to the endurance of service conditions; whether any part of the elongation displayed in the tensile test or the contraction of area then displayed will be realized in service; whether the ultimate tensile strength of the steel represents a particular value to the rail when in service; whether the ductility clause of the drop test has any real significance; whether the drop test itself has any definite relation to the serviceability of the rail. These and other queries suggest themselves. Chemical composition and finishing temperatures are factors which influence and control physical properties in rolled shapes—established by the laws of nature and not by specifications.



Five Photomicrographs of the Rail, All Magnified 100 Diameters. Upper left, taken just below running surface of the rail, shows flattening of the grain by wheel pressures. Upper center shows the same grain flattening and also a flowing toward the gage side of the rail head. Upper right shows grain flattening and a flow towards outside of the head. Lower left shows laminated structure of the fin formed along outside edge of the head; z-shaped dark lines indicate lines of rupture. Lower right shows apex of wedge-shaped rib at upper terminal of split head fracture; grain shapes are undisturbed

Opportunity occasionally offers to acquire data touching upon some of the above queries. On the present occasion microscopic observations were made upon the structural appearance of the metal of the rail adjacent to the running surface of the head, at the upper terminal of the split-head fracture, and at the lower terminals of the bifurcated fracture. The observations were directed to the distortion of the grain of the steel adjacent to the running surface, where flattening and flow occur immediately, due to the wheel pressures, and noting the undistorted shape of the grains at the split-head fracture.

The metal of this rail was capable of displaying ductile flow. The distorted shape of the grain next the running surface and the formation of a fin along each edge of the head is evidence thereof. At the terminals of the split-head fracture and the apex of the wedge-shaped rib at the upper edge of the split-head fracture there was, however, no appreciable distortion of the grain. At these places, microscopically, evidence was absent of any appreciable permanent set of the steel having taken place. Ductile flow and brittleness in the same rail are here shown, the result of the manner in which the stresses were received. The same is true of other carbon steel rails. Whether any part of the elongation or contraction of area of the tensile test is displayed in service depends upon the manner in which those features are developed.

The depth of the zone of distorted grain was about 0.05 in. Below this depth normal shape of grain prevailed. A feature of interest is raised in this connection—namely, that microscopic evidence is not presented showing a disturbance of the structural state of the metal so far down as the origins of split-head fractures are located. Evidence of a state of internal compression in the upper part of the head does not rest upon microscopic indications, but upon the results of strain gage measurements. In comparing the results of strain gage measurements with the indications of the microscope it has not been made clear that the presence of internal strains of either tension or compression may be recognized with the aid of the microscope. If such were the case the most far-reaching results would come from the use of the microscope in ascertaining the existing states of strain in all kinds of engineering structures.

A plane of rupture may pass into or through a steel member without change in shape of the grain, and therefore without display of appreciable ductility. This has been found true in different grades of steel. The behavior of rails in service furnishes the basis for the

query concerning the value in itself of the ductility clause of specifications. A greater or less display of elongation will take place in steels, depending upon their composition, when tested in such a manner as to permit of the display of ductility; that is, certain steels inherently possess such ability by reason of their chemical composition.

Specifications can enumerate these numerical values, but without changing the results. These remarks are made because the failures of materials are often attributed to lack of meeting specifications, when as a matter of fact the relation between the specified properties and the ability of the material to endure service stresses has not been given consideration. This is a plea for a better understanding of the specific causes which lead to failures, in which those of rails present notable opportunities.

In summation, the failure of the rail which caused the present derailment was due to the presence of a split-head fracture. Wheel loads cause distortion of the grain of the steel and induce lateral flow of the metal at the running surface of the rail, the tendency of such loads being to spread the railheads. The successful resistance to such lateral forces depends upon the structural soundness of the metal in the railhead. Longitudinal streaks are lines of weakness which influence the formation of split-head fractures and locate their incipient points of origin. Longitudinal streaks are due to casting and mill conditions. Their elimination, or reduction in numbers and gravity of development, are matters for the steel makers to consider. The ages at which split-head rails manifest themselves indicate such fractures are of slow and progressive development.

It is a matter of conjecture, although having the appearance of probability, that split-head rails would be unknown if strictly seamless steel were available for rails. The rail problem is intensified by reason of the employment of high wheel pressures. Soft rails display mashed heads; hard rails furnish a large number of transverse fissures.

There is a popular fallacy that split-head rails do not constitute a dangerous type of fracture, since at certain stages in their progress of rupture they may be detected in the track. This detection, however, comes after the necessary margin in strength in the rail has been practically exhausted, and not prior thereto. An element of danger has arisen when split-head rails are detectable in the track. An economic question is involved in the elimination of the causes of split-head failures, since many rails are removed for this cause which are not otherwise unserviceable. Finally, split-head failures should not be reported as piped rails, for they form quite a different problem.

TRADE ASSOCIATIONS

Government to Announce Affirmative Policy Respecting Open-Price Organizations

WASHINGTON, Aug. 16.—Following discussions during the past week between Secretary of Commerce Herbert Hoover and Attorney General Harry M. Daugherty, announcement has been made by both officials that an outline of policy to be pursued regarding open price and trade associations is soon to be published. Secretary Hoover especially has emphasized the need of letting business interests of the country know as nearly as possible what they may do within the law. It is his view that an affirmative rather than a negative policy should be laid down and used as a chart for the guidance of business. Until this is clearly established, it is pointed out that close co-operation between the Government and business interests of the country cannot be expected, because of the uncertainty on the part of the latter as to whether or not they are violating the law in supplying the Government with statistics.

So-called open price and trade associations particularly are interested because they are being asked to aid the Department of Commerce in providing it with data concerning industrial activities. Unless assurance is given to them that they may do this freely, without fear of legal interference, doubt has been expressed that they can be of any great and continuous aid in helping the department. For instance, it has been explained, the Department of Commerce through the initiative of Secretary Hoover, has begun the monthly compilation of commodity tables, giving an outline of business conditions in what is known as "A Survey of Current Business." It has been observed that there were only two trade associations that supplied data for the first number of this document, issued under date of July 1. The inference has been that associations generally have refrained from a more active participation in the work in the absence of assurance that they are committing no breach of the law.

Both Secretary Hoover and Attorney General Daugherty have on several occasions expressed the view that the vast majority of these trade associations are entirely legitimate and do constructive work that is of great importance to the national welfare. They, of course, have recognized that there are exceptions. Investigation by the Department of Justice of these associations which are alleged to exist in violation of the law, however, will in no way be an attempt to disturb commercial or industrial activity unnecessarily, according to a statement made by Attorney General Daugherty last Thursday.

"The Department of Commerce," said Mr. Daugherty, "is much concerned about the welfare of business. Mr. Hoover and myself have discussed the situation and we both are anxious to give business reasonable assurance that it will not be disturbed by Government action or legal interference. There are a great number of trade associations and organizations of business that are of much benefit to business in general. The majority of these organizations are desirous of doing the right thing. There are, however, some which, under guise of trade associations, go beyond the point permitted by law.

"Prices are fixed in an illegitimate way and illegal things are done and camouflaged," Mr. Daugherty continued. "Representatives of several organizations have come into the department and agreed to work in harmony and quit what might seem to be questionable practices. I want to say, of course," added the Attorney General, "that in taking this matter up and discussing it directly with representatives of the organizations should not lead to the conclusion that the Department of Justice will close its eyes to violations of the law. The administration wants to start right in dealing with business and believes that the present is the time to make the start."

The New York, New Haven & Hartford Railroad has placed an order with the Osgood Bradley Car Co., Worcester, Mass., for eight motor equipped electric zone cars costing $70,000 each, and 14 trailers costing $35,000 each, a total of 22 cars involving an investment of more than $1,000,000. The new rolling stock will be used on the railroad's main line between New York and New Haven, Conn.

In the table of by-product coke plants in operation May 1, 1921, published in THE IRON AGE, Aug. 4, it is shown that 885 Semet-Solvay ovens were under construction at Rosedale works, Cambria Steel Co. This is an error. The correct number is 88. The total number of ovens built or building as of May 1, 1921, therefore, is 11,628 instead of 12,425 as originally published.

Officials of Smith & Wesson, Springfield, Mass., firearms, have announced that the plant, which closed July 15 for a month, will not reopen before Sept. 6. Incoming business does not warrant an earlier opening.

Principles of Modern Rolling Practice*

Discussion of the Great Power Required for Finishing Passes — Phenomenon of Speed-Gain in Rolling

BY E. COTEL†

TO the strong ascendancy of rolling mill practice is due the commanding importance of the iron and steel industry. Beams and railroad rails, those most essential materials in modern life, can no longer be produced in sufficient quantity and quality by forging. The fact that rolling is merely an improved form of forging undoubtedly springs from the complete identity of all the phenomena of the two methods.

Like the spreading in forging, the work of rolling is evidenced by a considerable elongation of the bar, owing in both cases to its contracted section, and by a slight increase of its width. The difference of these two working methods in point of continuity touches neither their substance nor their nature. The difference in fact is only that the constantly repeated hammer blows in forge work coalesce in rolling to a single pressure, so that the periodic advance of the bar is replaced by a continuous automatic feed. By the rolling method merely the periodic interruptions are avoided, and hence we can say that rolling is forging become stationary. Indeed, by a mathematical analogy, we may say that rolling is integrated forging.

In spite of the fact of no theoretical difference between the two processes, the integral character of rolling gives it a huge advantage over forging. Because of the rotary motion and the avoidance of idle periods, that is, for the up and down strokes of the hammer and the free shifting of the bar, rolling has all the advantages of a mass-production method. The past century has well recognized these advantages and so utilized them that the development of the rolling process has been extraordinarily great and important.

The Power Required for Rolling

In designing a roll train a most important question, not only financially but in point of reliable operation, is the power required—that is, a determination of the

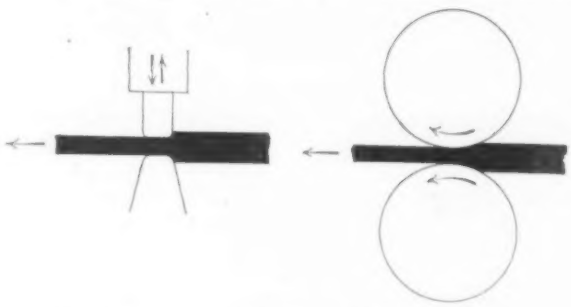


Fig. 1. Analogy Between Forging and Rolling

power for the drive. This question of power consumption was until recently unsolved. Theorists have indeed often tried to determine the rolling work by calculation, but always without practical result, since the power consumption varies too greatly for different roll-groove sections. Even the distinguished work of Dr. Puppe[1] could not solve the problem. The valuable collection of his test results deserves, however, the greatest recognition, because it furnishes a definite starting point to subsequent investigators.

My particular acknowledgment to Dr. Puppe is all the greater because the following simple and certain solution of the problem is based on his experimental data. After the appearance of his work I was of the opinion that a regular interdependence must certainly exist among his data, in spite of the fact that he had not himself discovered it. The graphical expressions of his power-consumption values unfortunately show neither regularity nor logical coherence. Nevertheless I discovered the desired regularity, upon choosing an entirely new way of studying the interdependence.

Rolling-mill work, due to the nature of rolling, can be nothing other than the work of squeezing out a certain mass of metal. Consequently, in passes of similar section and at the same temperature, the rolling work in ratio to a given weight of metal squeezed out per second must always be practically equal. The correctness of this assumption has been completely verified by the results.

Conformably with the foregoing, I have in my investigation[2] converted Dr. Puppe's dubious experimental results so as to support a conclusion that the power-consumption values for grooves of similar section show a substantially perfect equality. Details are given in

*Translated from *Montanistische Rundschau.*
†Chief engineer, Krompach, Czecho-Slovakia.

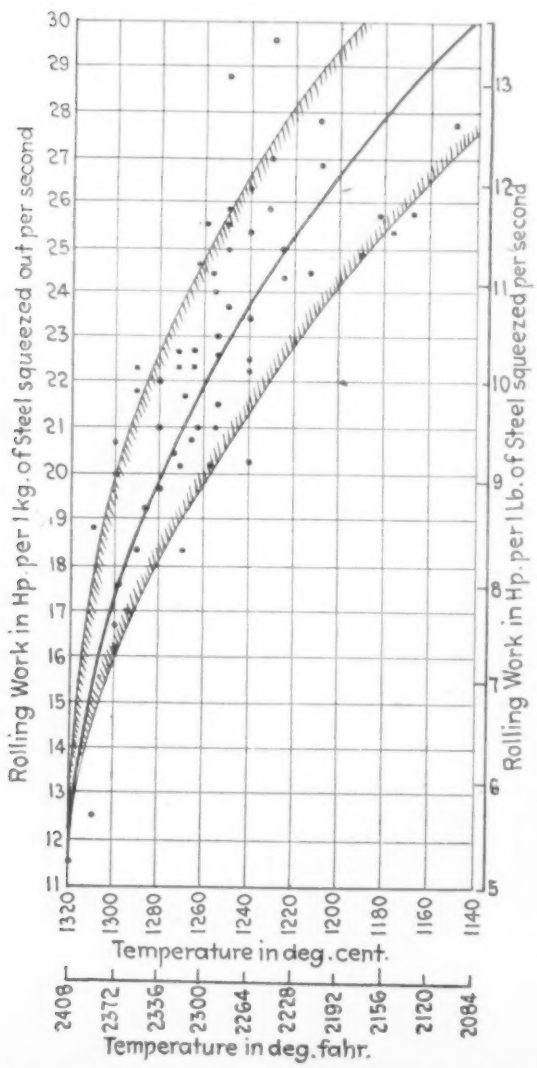


Fig. 2. Recorded Power Characteristics from Experiments of Dr. Puppe:—Rolling in the Gothic Pass

[1]Experiments to Determine the Power Required for Rolling Mills, 1919.

[2]For Determination of Rolling Work, *Stahl und Eisen*, 1918, No. 16, page 336.

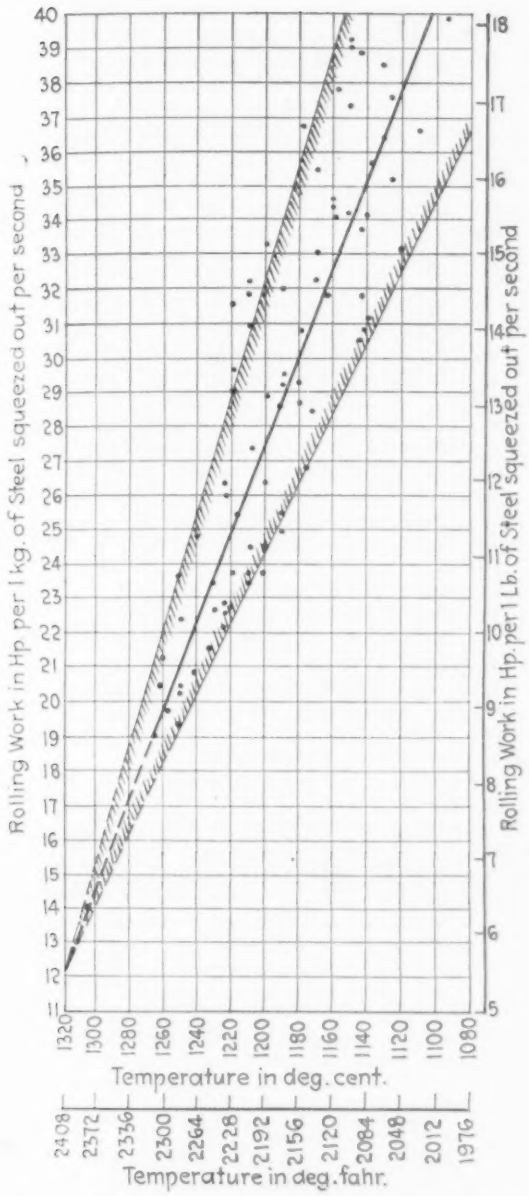

Rolling Work in Hp per 1 kg. of Steel squeezed out per second
Rolling Work in Hp. per 1 Lb. of Steel squeezed out per second
Temperature in deg. cent.
Temperature in deg. fahr.

Fig. 3. Power Consumption for Rolling in the Box Pass, from Experiments of Dr. Puppe

the article just cited. Here are brought together in an accompanying table only the values of work determined for the various groove sections.

It is noted that at the commencement of the rolling all the groove shapes consume relatively little power, and that the greatest absolute difference between the power-consumption values for the first passes through the rolls amounts altogether to only 20 hp. In contrast, the power-consumption values for the last passes are decidedly high, and the absolute difference between the power values of the finishing passes is very great.

This phenomenon may very plainly be seen in the graphical representations of the power consumption. It is self evident that for the purpose of determining the driving power needed, only the highest values are actually important. If we take for a unit the power consumption of the Gothic pass, since it is the lowest, we find the other maximum power-consumption values exceed it by the following multiples:

The box pass.....	1.3 times	The rail pass.....	3.7 times
The round finishing pass	1.3 "	The railroad-tie pass	4.1 "
The diamond pass.	2 "	The channel pass..	4.3 "
The flat-oval pass.	2 "	The tee pass.....	6.5 "
The flat-bar pass..	2.2 "	The I-beam pass...	7.6 "
The polishing-roll pass	3.7 "		

Publication of these power-consumption values for the various groove sections, which before that time had been wholly unknown, both absolutely and relatively,

[3] *Stahl und Eisen*, 1918, No. 27, page 613.

soon brought out a letter from the prominent specialist, A. Schöpf,[3] in which he fully confirmed my data and conclusions on the ground of his own experiments.

If we chart these values from experiment or calculation, we get a more perfect picture of the rolling work, and are in a position to draw interesting deductions from the curves. Figs. 2, 3 and 4 show graphically the same data from Dr. Puppe's experiments that were contained in the tables.

An interesting fact shown by the curves in the graphical figures is that the lower limit of the rolling work is practically the same for all groove sections and amounts to about 12 or 15 hp. (metric) for each kilogram per second of metal squeezed out (5.38 to 6.72 hp. per lb. per sec.). That is to say, the curves,

Table I

Rolling Work per Pound of Metal Squeezed Out per Second

Shape of Grooves	Lowest Hp.	Corresponding Temperature Deg. Fahr.	Highest Hp.	Corresponding Temperature Deg. Fahr.
Gothic	4.9	2408	13.4	2102
Box-pass	8.9	2307	17.9	1958
Round finishing	...	....	17.9	1940
Diamond	13.4	2161	26.8	1886
Flat oval	...	....	26.8	1958
Flat bar	14.7	2093	29	1814
Polishing roll..	22.3	2113	49.1	1958
Rail	14.3	2210	50	1803
Railroad tie...	18.3	2161	55.4	1719
Channel	24.6	2082	58	1666
Tee-bar	17.9	2071	87	1899
I-beam	13.4	2082	102.7	1744

extended below the range of the experiments, intersect the line of maximum roll temperatures always at a height of about 6 hp.

Naturally, the work consumption increases with falling temperature. While, however, this increase for the Gothic and box passes is moderate, and even the

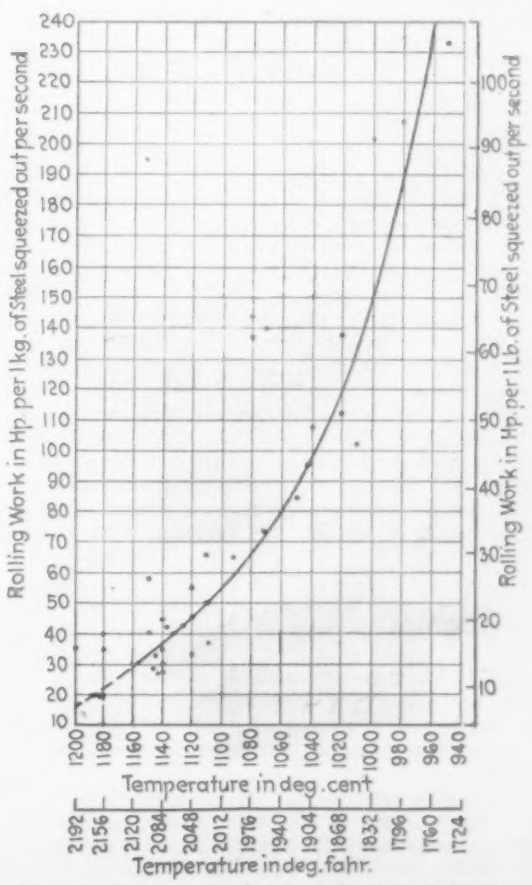

Rolling Work in Hp per 1 kg. of Steel squeezed out per second
Rolling Work in Hp. per 1 Lb. of Steel squeezed out per second
Temperature in deg. cent.
Temperature in deg. fahr.

Fig. 4. Characteristic Power Curve for Rolling I-Beams, as Shown by Dr. Puppe's Experiments

maximum values for these sections are not very high, the corresponding power consumption for the special sections rises rapidly, and the maximum power values for these grooves are several times greater than for the Gothic and box passes. For the Gothic passes a temperature drop of 40 deg. Fahr. corresponds to an increase of about ⅝ to 1¼ hp.; for the box passes, to about 1¼ hp.; whereas for the special sections it is 4 to 5 hp., even for the first passes, and 15 to 22 hp. for the finishing passes.

This indeed is characteristic of the special sections, as a result of the violent squeezing out in a lateral direction, or in consequence of extending the thin web and flanges, which rapidly cool and hence offer great resistance. Rolling-mill men are daily paying increased attention to the conditions of economical groove design, so that the rolling work, especially in the profiling passes, may be much reduced. But until this is brought about there can at least be no doubt that a driving engine chosen to perform present rolling work must be

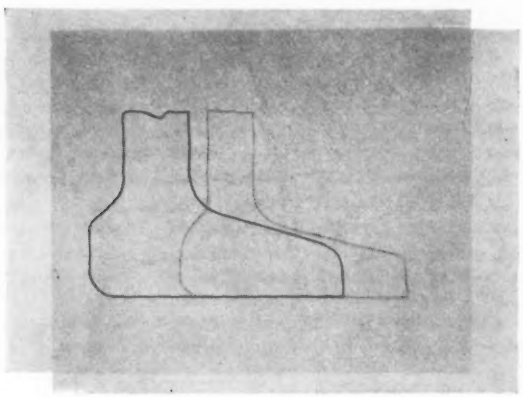


Fig. 5. Illustrates the Podhradsky Method of Laying Out Pass Profiles

more powerful than should really be necessary for reliable service; and at all events there is an advantage in having reserve power for a possible extension of the rolling-mill program.

On the Principles of Roll-Pass Design

Successful rolling, exactitude of profile, economical use of power and wear of rolls are dependent upon the form of the grooves, whence it is evident that high importance attaches to the methods of designing them. The very clever and practical method of Chief Engineer L. Podhradszky, of Krompach, for laying out the profile shape, avoids the use of awkward paper templets and substitutes for them a transparent oiled tracing paper so used that it is unnecessary to cut out the shape.

If we draw the outline of a groove with a hard pencil on a tracing paper, and the outline of the proposed roughing (or previous) groove on another sheet, we can superimpose them and thus can precisely observe and judge the working and filling out of the metal which it is intended to produce. The two sheets, laid one over the other on white paper, Fig. 5, lie stretched perfectly flat, do not stick together, do not tear, and they allow both profile outlines to be seen at once. But the chief advantage is the possibility of changing the form with a few strokes. This method is so perfect and simple that everyone who has tried it will use it.

Even the design of the grooving has had no pronounced, recognized rules. For laying out round, box and Gothic passes there are indeed very well-tried and generally familiar methods, but these are almost entirely lacking for the special shapes. Even the best well-known treatises on grooving design mostly handle this subject on the basis of good, well-tested examples, and only to a slight extent on the basis of definite, general rules.

The first rational and correct principle of a theoretical grooving method for the special sections (irregular profiles) has been offered in the notable study of W. Tafel, entitled "New Methods for Calculating Grooves."[1] A further development of Tafel's methods will lead to important progress in the field of grooving. Since, however, the present applications of his idea are quite complicated and tedious, grooving still remains ever a matter of experience and judgment.

The chief rule of all groove design is as follows: The change of shape in the cross-section shall be as simple, as easy, as possible. The more violent the change of shape in a pass,

1. the greater will be the power consumption,
2. the greater will be the wear of the groove,
3. the less will be the chance of correctly filling out in the groove.

Since this fact is established by experience, personal ingenuity will always play a leading rôle in grooving, even should the methods of grooving by calculation be fully adopted in practice. Mathematics is the science of absolutely inflexible figures, and yet there are many mathematical problems which have more than one answer. One solution may be long and complicated, another short, simple and clear.

In proof of this assertion the possibilities in rolling Phoenix rails offer a good example. The Phoenix (grooved) rails are, as generally known, manufactured in such a way that the grooves are channeled in the metal when going through the last two roll passes, by means of small horizontal auxiliary rolls. But this method is very inconvenient for the rolling work, on the one hand because the necessary attachments can generally be inserted in existing roll housings only with great difficulty, and on the other hand because the old driving engines are usually too weak for this rolling work.

The problem of rolling 60-kilogram (121 lb. per yard) Phoenix rails in a comparatively weak reversing mill was solved by forming the horn of the groove like the flange of a beam or rail, and bending it in during the last pass without special appliances. As shown in Fig. 6, *a* is the old and *b* the new shape of the next to the last roll groove. The trial rolling gave a good result and, despite the fact that the matter was never

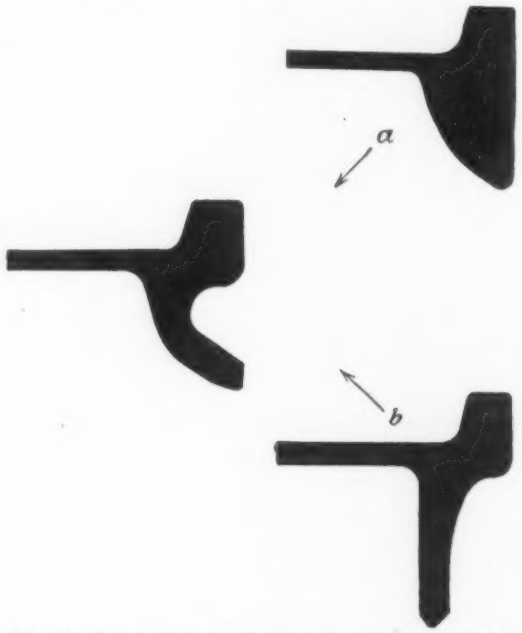


Fig. 6. For Rolling "Phoenix" Rails, *a* Shows the Section Formerly Used, and *b* the Section Now Used, Immediately Previous to the Last Pass, Which Gives the Final Section Shown at Left

carried out commercially, some years later an English book gave the same solution, this having been employed in practice.

This is evidence that even methods very generally used can be simplified and improved, or that problems in rolling practice almost always have more than one correct solution. The correctness here relates solely to the right shape of the last cross section, since the economy of the various solutions may widely differ.

Confirmation comes also from A. Schöpf, in his discussion of my work, where he remarks: "Cotel says that the rolling work, at least in the profiling passes,

[1] *Stahl und Eisen*, 1909, No. 18, page 651.

must in the future be lessened. Of late I have concerned myself with design of passes for wire and have found that even in this subject, which seemed unqualifiedly a closed one, considerable progress is still possible."

Stretching and Speed Gain [Bar Acceleration] in Rolling

The fact that the stretching or spreading of the metal between the rolls takes place in one direction, opposite to that of the bar's movement, or that the roll cannot perform the stretching forward, but only backward, is of no special significance, and interesting merely because it is a fact first determined a few years ago. These observations and determinations had in the meanwhile been confirmed by Haedicke.[5]

The speed gain [acceleration of the bar to a speed greater than that of the roll circumference] is a very interesting phenomenon accompanying the rolling, the properties of which have not until recently been fundamentally investigated. Following my article, "The Stretching in Rolling,"[6] Dr. Puppe published, in his study of the speed gain, a rich collection of his experimental data relating to it. A single fault in his notable work is that he takes the phenomenon of the speed gain to be altogether a regular one.

There is no doubt that, besides the factors which Dr. Puppe observed, there are several others which have an influence upon the degree of speed gain. To prove this and disclose such factors, I made various experiments in the year 1909, and in my article[7] showed that:

(1) Besides the factors observed by Dr. Puppe, both the amount of lateral pressure and the rotary speed of the rolls exert a considerable influence upon the amount of the speed gain;

(2) The amount of speed gain may vary for a single bar by about 100 per cent;

(3) The speed gain cannot therefore be considered a regular phenomenon determinable with formulae.

Consequently the claim of Dr. Puppe that the phenomenon of speed gain can be utilized in designing the roll grooves is unsound. This, however, is also stated by W. Tafel in his article on the latest methods of designing grooves, already mentioned, although he had made no experiments concerning it.

[5] *Stahl und Eisen*, 1908, No. 24.
[6] *Stahl und Eisen*, 1908, No. 5.
[7] *Bányászati és Kohászati lopak*, Budapest, 1910, No. 7.

Causes of Cracks in Case-Hardened Objects

Grinding Found to Be the Predominating Factor—High Speed of Rotation a Means of Avoiding Cracks and Softening

REVUE DE METALLURGIE for April has a most interesting paper on the reason for the surface cracks so frequently seen in case-hardened objects after grinding. It is by Messrs. Guillet, Galibourg and Beuret. First a description is given of the cracks, well illustrated by photographs, and a review of the literature, in particular the recent paper by Hanson and Hurst before the Iron and Steel Institute. Their conclusion was that if the network of cementite could be suppressed the pieces rejected for cracks would be greatly reduced.

Grinding a Main Cause of Cracks

In order to study the question the French experimenters treated the specimens to prolonged attack in 10 per cent sulphuric acid. This develops cracks which are only latent in the specimens. At least fifteen main factors entering into this question of formation of cracks are given in detail in the paper; but by means of careful observations it was found possible to simplify the matter and not investigate the influence of all of them. It was soon found that the grinding used to dress the pieces to the desired size after treatment was the predominating factor. For instance, in the case of shafts the cracks always form a closer network at the ends where there is most grinding, than in any other part. Plane surfaces, where the wheel works on the flat, crack more easily than cylindrical surfaces. Further, it is a striking fact that the cracked pieces, which are very hard before dressing, may be readily filed after the cracks are produced. This seems to indicate that they have suffered a superficial tempering or reheating which could only come from heating while being ground. These views are supported by the case of a shaft the details of which are given.

Next is a short review of the subject of the cracks formed in the liners of guns, and the theories explaining the cracks produced during erosion as outlined in 1915 by the eminent Russian metallurgist, Tchernoff. These theories the authors believe to be applicable to the present case.

Methods of Prevention

Careful experiments were carried out to determine methods of avoiding the cracks. It was decided to consider only those pieces sound which did not develop cracks after 24 hours in the 10 per cent sulphuric acid. All the experiments were concentrated towards the aim of obtaining the minimum of heating and tempering while grinding to the desired finished size. In a tentative way it was found, other things being equal, that this result was obtained when the piece was turned as rapidly as the arrangement of the machines allowed. It must be understood that the wheel also turns as usual. The theoretical reasons for this are given in detail. Two typical cases taken from the results obtained may be given. Fifty-two cylindrical bars, 14 mm. diameter, of ordinary carbon case-hardening steel were treated, Nos. 1 to 28 to have 0.5 mm. depth of case, and Nos. 29 to 52 to have 1.0 mm. Each of the two lots was divided in two parts, one being reheated at 150 deg. C for 30 min., and the other ground without reheating. Each of these lots was in turn divided and these subdivisions ground to size, one with the piece turning at 120 turns per minute and the other at 500. The striking results of this test are shown below:

Bar Nos.	Depth of Case	With or Without Reheating After Quenching 800—8250 deg. C. in Water	Bar No's.	Conditions of Grinding Speed of Piece, r. p. m.	Results of Grinding After Etching in 10% Acid
1	0.5 mm	Without	1 to 7	120	All cracked
to	0.5 mm	Without	8 to 15	500	No cracks
28	0.5 mm	Reheated	17 to 22	120	All cracked
	0.5 mm	Reheated	23 to 28	500	No cracks
29	1.0 mm	Without	29 to 34	120	All cracked
to	1.0 mm	Without	35 to 40	500	No cracks
52	1.0 mm	Reheated	41 to 46	120	All cracked
	1.0 mm	Reheated	47 to 52	500	No cracks

As may be seen, whatever the conditions of treatment, the pieces are cracked or not depending upon whether the speed of rotation of the piece was sufficient or not.

Results With Case-Hardened Pinions

A second test was made on case-hardened pinions, quenched and ground on the plane surfaces normal to the axis of rotation and on a part of the shaft. These pieces were considered as giving an enormous loss because of the cracks found on the cylindrical surfaces, and more particularly on the faces of the pinion. Photographs are given in the original paper

showing these conditions. The results given in the table below confirm fully the previous results obtained. In this case, also, notwithstanding very different working conditions, the speed of rotation of the piece dominates the question.

Results of Grinding Pinions—All Case-Hardened for 0.8 mm Depth and Quenched in Water at 800 to 825 Deg. C.

Machine	Pinion No.	With or Without Reheating	Conditions of Grinding Speed of Piece	Results
A	1 to 4	With	500 r.p.m.	No cracks
A	5 to 8	With	120 r.p.m.	Badly cracked on the two faces and 15 mm. on the two ends of shaft.
A	9 to 12	Without	500 r.p.m.	No cracks
A	13 to 16	Without	120 r.p.m.	Same as 5 to 8
B	17	Without	One face with new wheel, 120 r.p.m.	Badly cracked
		Without	One face with dirty wheel, 120 r.p.m.	Like 5 to 8
B	18	Without	Both faces with dirty wheel, 120 r.p.m.	Like 5 to 8
B	19 to 20	Without	Both faces with dirty wheel, 440 r.p.m.	No cracks

The tests carried out leave no doubt that neither the depth of the case, nor cold work, nor the presence of cementite in excess is a principal factor in the production of the cracks. It was interesting to see whether heating alone would make pieces crack without the intervention of grinding. For heating the piece very rapidly and on the surface only, the most active of all the methods tried consisted of pouring on the case-hardened and quenched surface molten copper, raised to 1200 deg. C, then cooling the whole with a jet of water, as when grinding. Under these conditions cracks are produced on the surface and are visible even without etching. A photograph is given in the paper showing the cracks brought out more clearly by etching.

The experiments, therefore, lead to the following conclusions:

1. The cracks are due more than anything else to a heating of the metal while grinding.
2. It is possible to obtain considerable cooling with plenty of water and to avoid all cracks by giving the piece to be dressed a circumferential speed high enough (about 400 r.p.m. for pieces 15 mm. (0.591 in.) diameter).

Also the same heating that produces the cracks is the cause of pronounced softening of the surface. In this case also, and for the same reasons, with sufficient speed of rotation of the piece practically all softening is avoided. G. B. W.

Universal Machine Shop Rule

To aid in solving many machine shop calculations without the necessity for using pencil and paper, R. Poliakoff, 709 Sixth Avenue, New York, has designed and placed on the market a 12-in. rule which contains on its two sides various scales by which calculations can be made by the aid of a pair of dividers. These scales, which are laid out to logarithmic measure, permit the user to solve a number of machine shop problems of which the following are perhaps typical:

Given diameter of bar and cutting or grinding speed, to find the r.p.m. Given diameter of bar and r.p.m. of grinder or lathe, to find the grinding or cutting speed. Given length of bar, number of r.p.m. and feed in inches per revolution, to find the time required to turn or grind the bar. Given depth of cut and feed of machine, to find the volume of metal removed. Given speed and feed of machine, to find the area machined.

As the rule contains both English and metric scales, its use is not confined to calculations. It has a high, white celluloid finish, so that dirt accumulated in the shop may readily be removed.

Rogers, Brown & Co. have been appointed sole agent in the United States for the sale of virgin aluminum, of various grades, produced by the Norsk Aluminum Co., Christiania, Norway. Stocks of aluminum will be carried at New York and Cleveland.

Safety Hooks for Handling Plates

Safety and speed in operation and simplicity of design are features claimed for the Comrie safety hook, designed by Alexander Comrie, Standard Shipbuilding Corporation, Shooters Island, N. Y. It is intended primarily for handling plates, though it is adaptable for piling, railing, piping; it can be made large enough to handle armor plate. The pull or lift can be exerted from any direction. Teeth at the gripping end of the tongue become engaged with the plate, so that if the strain is prematurely released the load will not be dropped.

It is made of a forged steel jaw, a tool steel tongue and BB chain, its weight being about 80 lb. It takes 20 sec. of two men's time, one man at the crane and the other at the hook to lift a 4-ton plate from the racks and place it upon a flat car. Two or more plates can be lifted at a time.

With Teeth at the Gripping End of the Tongue, This Hook Lifts Plates Safely

The standard clamp for plates, as used in shipyards, will lift plates from 1/16 to 1⅞ in. in thickness. So great is the grip that the tongue often has to be tapped slightly to disengage the clamp. It is claimed that the teeth do not mar the plates. The designer states that not an accident nor delay has been traceable to its use.

The Pennsylvania Tank Car Co., Sharon, Pa., has started work on an addition 100 x 400 ft. to its plant at Masury, Ohio, a short distance from Sharon. The additional facilities will afford employment for 400 workmen. The company will hereafter do both repairing and fabricated work at its Masury plant, and tank car parts will be manufactured, as well as assembled. Three miles of railroad tracks will be laid to provide storage for tank cars. The company is likewise installing a similar additional unit at its plant at Argentine, Kan., the structure to be 183 x 300 ft. The expenditure there will be about $150,000.

RAILROAD BILL HELD UP

Improvement in Many Industries Delayed—
—$500,000,000 Issue Is Maximum

WASHINGTON, Aug. 16.—With stimulation of the iron and steel and other industries largely dependent upon passage by Congress of the $500,000,000 funding bill for the railroads, concern has been expressed over the obstacles this legislation is facing. The point has been reached where it seems unlikely that it will be enacted before Congress takes a recess and there is no indication how much time will be required after Congress reassembles. The strongest opponent to the measure is Senator LaFollette of Wisconsin and the tactics he has adopted are largely responsible for the slow progress being made. He has asked that former Directors General McAdoo and Hines of the Railroad Administration appear before the Senate Committee on Interstate Commerce, which, with the House Committee on Interstate and Foreign Commerce, last week began hearings on the bill. The witnesses were Director General Davis and Chairman Meyer of the War Finance Corporation. Mr. Hines is abroad and it will be a considerable time before he can be in Washington.

Meanwhile industrial and financial interests still hope that the measure can be enacted without the delays its opponents plan. As is known, the President is urging its passage, recognizing the importance of such action to relieve the unemployment situation. Mr. Meyer has told the Senate committee that if Congress does not pass the funding bill it will be necessary to make a direct appropriation of $250,000,000 in order to enable the Government to pay the railroads the net balance due them. Members of both the House and Senate committees have received communications from business interests urging quick passage of the bill. Among them is one addressed to Chairman Cummins of the Senate committee by Charles A. Livingston representing the Illinois Manufacturers' Association, urging prompt enactment of the bill "in order that the railroads, industries and all shippers may immediately be relieved, that transportation troubles may be averted and unemployment be lessened."

For General Business Betterment

Both Mr. Meyer and Mr. Davis have vigorously urged quick passage of the bill. The former has spoken of it as a measure for country-wide as well as railroad rehabilitation and vigorously denied that it was a "hand-out" as it has been characterized by some opponents. If it is passed equipment trust certificates running up to $310,000,000 in value which were deposited with the Railroad Administration during its control for the purchase by the Government of engines, cars, rails, etc., would be sold to the War Finance Corporation. The latter would dispose of them in the market gradually. At present these certificates, which bear interest at 6 per cent, are not marketable securities.

Assurance has been given by Mr. Davis that the maximum of funding under the bill would be $500,000,000 and the amount would probably be less. This statement was made in answer to claims by Senator LaFollette that the bill really would authorize the War Finance Corporation to fund or sell over $1,000,000,000. Making a detailed analysis of the railroad debts to the Government for additions and betterments, mostly equipment, furnished the carriers during the war, Mr. Davis said a total of $1,144,000,000 had been advanced for that purpose. For this, it was said, the railroads had given $310,000,000 in equipment trust notes and $70,000,000 had been paid in cash, leaving a balance of $764,000,000, of which $61,000,000 already has been funded privately. Approximately $700,000,000 of the Government advances consequently have not been funded, it was stated, but for various reasons the bill would require funding of less than $500,000,000. Mr. Meyer said that not all of the railroad securities held by the Government would be accepted and marketed by the War Finance Corporation. Only good securities, it was pointed out, will be funded.

Strike Settled on Open-Shop Basis

MILWAUKEE, Aug. 15.—Striking employees of the Hamilton-Beach Mfg. Co., Racine, Wis., manufacturer of domestic and industrial appliances with electric motor power, called off a strike instituted more than a year ago to enforce a demand for recognition of the union. Following a conference between Fred J. Osius, president of the company, and R. G. Knudson, representing the Industrial Commission of Wisconsin, striking employees held a meeting and decided to declare the strike off.

On Aug. 1, 1920, between 750 and 800 employees walked out when the company enunciated the "open shop" policy. Since that time more than $2,000,000 in wages has been lost to strikers, according to conservative estimates. Suits involving $1,200,000 in damage claims resulted. The company brought suit against union labor organizations for damages, while the unions retaliated with counter suits demanding damages for alleged false arrest and personal injuries. There were numerous riots and at one time when an appeal was sent to the Governor for State troops for protection of the plant, the sheriff was ordered to appoint 100 deputies to preserve order.

An official statement signed by "The Former Employees of the Hamilton-Beach Mfg. Co." says: "The men and women who were former employees of this company, after carefully considering the sacrifices that had been made financially fighting for their cause and also that it would be for the best interest of the community to have this affair settled, are willing to accept the proposition of Mr. Osius."

A statement by the company said in part: "This company believes that its interest, as well as the interest of every employee, are best and most honestly served by maintaining an open shop. We stand for the principle of the open shop in which union and non-union men may work without molestation or being forced to join any organization. We pay wages and maintain shop conditions which compare very favorably with any other manufacturers in our industries. This company is glad to discuss matters appertaining to proper working conditions and fair, clean treatment, and expects in return just what every good workman knows is due the company. No employee or class of employees needs the help of any outside agitator to correct conditions in this shop. The employment office of this company is now open. Applications will be received by mail or at the office. The company will open its factory just as soon as sufficient employees apply for work so that it can operate."

DETROIT, Aug. 13.—During the week ended Aug. 2 the 79 plants of the Detroit Employers' Association had 118,803 men on their payrolls. This was an increase of 1231 over the preceding week. There were 11,083 men working on part time, with an average week of 36 hr. This compares with 12,728 and 35 hr. for the week ended July 26. The number of men employed for the week was about 64.5 per cent of the number employed by the same plants at about the same time last year. Production, according to all reports, in these plants has mounted considerably about 80 per cent of production last year at this time.

July wage disbursement of $3,323,982 by Youngstown, Ohio, industries is the lowest in three years, reflecting manufacturing stagnation, irregular employment and unemployment. It represents a decline of $440,234 from the June payroll and compares with $6,402,521 paid in July, 1920, a loss of $3,078,539. The exceeding low rate of steel mill operations during the period represented accounts for the small distribution.

Among the speakers at the annual convention of the National Implement & Vehicle Association at Chicago, Oct. 12 to 14, will be Herbert Hoover, W. P. G. Harding, governor of the Federal Reserve Board, and Henry C. Wallace, Secretary of Agriculture.

CONTROLLING BLUEPRINTS

How Engineering Department Maintained Correct Drawings and Money Was Saved

BY H. M. FITZ*

Blueprints have been mounted in one form or other for shop use for many years, but in a large shop where hundreds of blueprints are made and issued daily, costs are watched closely and any suggestion that is made to improve conditions with a possible increase in cost is questioned. The management of a motor truck company went to the trouble to find out what mounting the prints costs, and what is saved by so doing.

Cabinet Provides for Three Sizes of Blueprints, Which Are Mounted on Cards, and Checks Are Used for Keeping Track of Withdrawals

In a shop that is not entirely a one-product shop but doing different kinds of work, it is necessary that the blueprints be placed in the shop in the most substantial way possible. Sometimes the engineering department loses control of the drawings and blueprints the minute they leave the drawing room by not properly listing and checking the number of each that goes to the shop. The fact that blueprints are still engineering property and are merely loaned to the shop to use is overlooked. Any corrections or changes should be recorded by the engineering department.

For example, an experience is recalled of finding four blueprints (spoiled work caused the search) that were issued at four different times with certain dimensions changed each time, but the unchanged prints were not taken care of either by correction or collection. Others were found with changes in dimensions made by some one in the shop. The engineering department had no record of changes being made. Suggestions from the shop are practical and necessary, but with proper control the responsibility should rest on the engineering department.

Checking out blueprints in the shop helps to decrease the loss. For instance, if a print drops behind a tool box or a bench, it is not likely to stay there if there is a check on it. The system helps to locate prints in case of changes during process and reminds the user of returning it to the proper place.

The average blueprint costs about 21 cents to produce. A shop that receives a daily average of 195 blueprints has an expense on this account of $40.74. In this case, it was found that 50 per cent of the blueprint work was replacement of shop-worn prints rendered unreadable from handling and misuse. Spoilages occur from oil-stained and creased blueprints, adding to the manufacturing costs, so the management stopped this replacement work—not only by mounting them on cardboard and shellacing—but placed an eyelet to hang up a print, providing in addition a hook at each machine and bench for that purpose. A cabinet was built to take care of three different size prints that have been standardized, also boards placed book fashion with the drawing numbers in numerical order and hooks for checks.

The additional cost amounted to 7 cents per blueprint, making a total cost of 28 cents. By reducing the 50 per cent replacement, or 97 blueprints, the possible saving is $97 \times 21 = \$20.37$ per day, and seems worth while from a cost standpoint alone. In addition the general appearance of the shop was improved and the saving gave the blueprint boy more time for making records.

*McVicker Engineering Co., Minneapolis.

Foundries Agree to Report Pig Iron Stocks

Out of 1050 members of the American Foundrymen's Association using pig iron, 450 have thus far agreed to co-operate with Secretary of Commerce Hoover by supplying monthly a report of pig iron on hand at the end of the month and pig iron used during the month. Only three firms have expressed themselves as averse to giving out such information. The poll of the membership of the association was decided upon by the board of directors following a conference on iron and steel statistics held in the office of the Secretary of Commerce on May 18, at which W. R. Bean, president, represented the association. The sentiment of members was sounded not with the idea that such statistics would be collected by the American Foundrymen's Association, but rather to ascertain for Secretary Hoover what firms would be willing to supply his department with the desired information. The results thus far are regarded as highly satisfactory and further replies from members are looked for.

The Tank Car

Under the above title, the Pennsylvania Tank Line, Sharon, Pa., has issued a paper bound book of about 150 pages, with comprehensive index, which gives an immense amount of information regarding the use of tank cars, the rules of railroads with regard to tank cars on their lines, regulations for the transportation of inflammables, mileage allowances, safety appliance standards, specifications for tank cars of both the American Railroad Association and the Master Car Builders' Association, car accounting records and specifications of cars made by the company. The work is so complete in all the details under the headings listed above that it must be of great benefit to both shippers and other users of tank cars, as well as the railroad systems over which they operate. In the rear of the book are given a number of general tables and drawings showing such items as capacities of cars for varying depths of contents, details of safety valves, heating coils, sill construction and other matters connected with the construction and equipment of the cars.

Foundrymen's Association to Publish Monthly Bulletin

The first issue of a monthly bulletin to be published by the American Foundrymen's Association has gone to press. The bulletin will be 6 x 9 in. and will contain eight pages. Its purpose is to keep members advised of the progress of committee work between conventions, to record any other association news of importance, and to call attention to important articles in the technical journals, by publishing abstracts from those papers. C. E. Hoyt, secretary-treasurer, Marquette Building, Chicago, is the editor.

Use of Cupolas in Open-Hearth Practice

Melting High Silicon and Other Pig Iron Continuously and Supplying Hot Metal to Four 60-Ton Basic Furnaces

BY V. W. AUBEL*

IN Bessemer steel making before the days of direct metal and mixers, continuous cupola operation was the dominant factor in production. The prevailing practice was to have several of these cupolas in reserve to allow for repairs, relining, etc., so that the supply of hot metal would always be sufficient for the converters. But even in Bessemer practice the run of a cupola was seldom more than six days, the mill as a general rule being shut down from midnight Saturday to midnight on Sunday of each week. Some large foundries operate heavy-duty cupolas, but as a rule they are in operation continuously for only 10 hours of each day, the bottom being dropped each night.

The use of cupolas for supplying hot metal to basic open-hearth furnaces is probably not a practice in steel plants of any size, and certainly it cannot compete with the use of mixers and direct metal where a blast furnace is a unit of the plant. Nevertheless, for basic open-hearth plants which use cold pig charges, not having a blast furnace as a unit of its plant, it might be of advantage to premelt in the cupola. A great many factors necessarily enter into the desirability of using such a process but, as an example of what may be done in an emergency, this article may be of some interest.

The steel plant in which the following run was made consisted at the time of only one blast furnace and four 60-ton basic open-hearth furnaces with the necessary coke ovens and mills, but with no hot metal mixer. During a forced temporary shutdown of the blast furnace for repairs the management was faced with the necessity of using cold pig charges for the open-hearth furnaces. Something like 20,000 tons of pig were available, which had mostly all been stocked by a magnet crane in one large pile, no effort having been made to sort the different grades. This iron ranged in silicon from 0.50 to 6.00 per cent. Previous practice with cold pig heats had not been very successful from the standpoint of time. They invariably ran from 18 to 20 hr. against 10 to 12 hr. for the hot metal heats. A great deal of the loss of time with cold iron was due to the difficulty of regulating the ore and lime in the open-hearth charge when the silicon content of the cold pig was not known. The heats invariably either melted "soft" or high carbon and time was lost in recarburizing or oreing down as the case might be. The variable silicon content of the pig also caused a great deal of delay due to erosion and eating away of furnace banks and bottoms. When a patch of high silicon was struck for the charge, the result was that the furnace not only melted "high" and the heat was a long one, but very often the banks and bottoms would require repairs and more loss of time resulted. The yield from hot metal heats was also found to be from 2 to 5 per cent higher than with cold stock.

The following letter from the author accompanied this article:

"I was very much interested in an editorial paragraph in the July 14 issue of THE IRON AGE, *in which you quote from an article in "Foundry." It is recommended that the lime charge in the cupola be regulated more after the practice followed in burdening the blast furnace, and in this way eliminate considerable of the sulphur in cast iron scrap. I wish to add my testimony to this recommendation, as I know from actual experience that it is possible not only to desulphurize to a considerable extent in the cupola, especially when the sulphur content is abnormally high, say 0.100 per cent or over, but also to desiliconize to a very great extent by using larger quantities of limestone than is usual in cupola practice. Although not a cupola or foundry expert, having followed blast furnace work all my life, yet I had at one time several years ago to melt some 20,000 tons of miscellaneous pig iron in the cupola. My experience gained over several months of very heavy-duty cupola operation led me to think that a great many cupola operators are not obtaining the purifying effect from their cupolas which it is possible to get simply by adding the proper amount of limestone and maintaining a proper slag.*

"My interest in this matter has influenced me to inclose a small article which covers my experience in this line. It was written just previous to the war and may contain some portions which are of interest"

Two large spiegel cupolas had just been completed and it occurred to the management that under the circumstances it might pay to use these for supplying the open-hearth with hot metal. Aside from the increased yield and gain in time of heats it was thought that the uniform grade of metal resulting from the remelt would save much of the delay on banks and bottoms. In other words the cupolas were to perform all the functions of a mixer.

The cupolas are very strongly built on four columns imbedded in brickwork. The base is a cast steel circular plate with heavy double drop doors. They are 30 ft. high from base to charging floor, with a shell diameter of 9 ft., and working diameter of 6 ft. The slag notch is 3 ft. from top of drop door, with the wind box 7 in. above this. The wind box contains 40 tuyeres each 3½ in. in diameter, placed in four rows. There are eight manholes in the bottom of the wind box and all of the tuyeres except eight, where the blast pipe enters the box, are accessible through small plate covered handholes with eyesights. Two manholes are provided for access to the hearth. Blast is furnished through a common blast main 24 in. in dia. by a No. 8 Green rotary blower, belt driven by a triple expansion high-speed steam engine. Butterfly valves control the wind for each cupola.

Adapting the Cupolas for Heavy Duty

As the capacity of the blower or the efficiency of the charging arrangement were not known, a trial run was made with one cupola. The situation of the cupolas gave only a very limited stockyard. The charging was by hand with small unweildy 2-wheeled hand buggies similar to what is used for hand filling blast furnaces. These buggies would only hold 1000 lb. of pig or about 250 lb. of coke and only one buggy could be raised to the charging floor on each trip of the elevator. A very small tonnage only could be handled in this way so the buggies were discarded and a system of narrow-gage tracks installed. Two different gages and two sizes of 4-wheeled side tipping trucks were made use of. The small 18 in. gage trucks would hold

*Blast furnace superintendent, Midvale Steel & Ordnance Co., Coatesville, Pa.

2000 lb. of pig, and the large 2 ft. gage trucks used for coke would hold 600 lb. A large flat sheet was fixed at the foot and in front of the elevator and both gages of tracks let onto this sheet which, kept always well oiled, allowed either size of truck to use both elevators. A steel plate charging floor and large openings into the stack made these trucks very suitable for handling on top. The pig and coke were filled directly from the cars into the small charging trucks.

The original arrangement shows how each cupola tapped from its own spout into a common ladle, which was spotted on a recording scale underneath the tapping platform. The slag notches were on the rear 120 deg. away from the tap hole and the slag was allowed to run through holes in the floor onto the ground. As a considerable quantity of slag was anticipated, this arrangement was reversed to allow the use of a steam dumping blast furnace slag ladle. New tap holes were cut almost underneath the old slag notches and a large Y runner built with brick. The leg of the runner was a brick-lined steel spout. New slag holes were cut directly over the old tap holes and the slag run through the floor into the ladle.

Operation

After the alterations, as mentioned, were made, both cupolas were prepared for blowing in. After the drop doors were put up, all cracks were well luted with fire clay; then a 6-in. bottom of dry ground fire brick was well rammed with a slope to the tap hole. The tap hole and breast were made up of tar and burnt dolomite well rammed into place. A hole, 2 in. in diameter, was left for slagging. The second and fourth rows of tuyeres were bricked up, as the capacity of the blower was hardly sufficient for maximum production. A wood fire was started in each cupola by inserting wood through the manholes and the addition of some kerosene oil from the charging platform. More wood was thrown in from above and then a couple trucks of coke were added until the bed was about a foot above the tuyeres. When the coke was glowing on top, the manholes were bricked up and the cupolas charged full. The bed was of 5000 lb. weight and on account of the high ash content of the coke, it was necessary to charge some lime with this bed, otherwise the first slag would be so viscous that it would adhere to the hearth. It was found to be of vital importance to get a good hot free running slag from the very first and in our practice we used burnt lime for the bed and the initial charges. The blowing-in charge was as follows:

6 Trucks coke (600 lb. each).
15 Shovels burnt lime (20 lb. each).
2 Trucks coke.
8 Shovels burnt lime.
4 Trucks pig iron (2000 lb. each).
2 Trucks coke.
8 Shovels burnt lime. } 2 charges made cupola half full.
4 Trucks pig iron.
3 Charges { 2 Trucks coke. 14 Shovels limestone. 5 Trucks pig iron.

Charging commenced on hot coke bed at 7 a. m.; blast was put on at 10.30 a. m. and first tap was at 1.00 p. m. Both cupolas were filled and blown in together. About 140 r.p.m. was the capacity of the engine giving the blower 90 revs. and 16 oz. blast pressure at the cupola. The cupolas were tapped every 20 min. into a 30-ton blast furnace iron ladle. It took about one hour to fill a clean ladle. Coke breeze was used liberally on the surface of the metal to prevent skulling. When the ladle was filled, it was taken by the engine, weighed and delivered to the open-hearth department, and another ladle placed for filling. Three ladles were kept in service. It was necessary for the cupola foreman to keep in very close touch with the steel melter so as to supply the hot metal at the right time. Three 8-hr. shifts were worked and an engine was in attendance at all times to handle the hot metal and bring up stock to the cupola yard. The pig was loaded by magnet in the open-hearth stockyard and the coke used from trucks just as it came into the plant yard. The slag ladle was dumped once each day.

Considerable trouble was experienced keeping the small tuyeres open. It was necessary for one man almost to spend his entire time punching them open with an iron bar. By using tin cylinders instead of steel pipes for tuyeres we were able to increase the diameter from 3½ to 5 in.

One of our first troubles to overcome was the tendency of the slag notch to become greatly enlarged due to the cutting action of the slag. We were unable to keep the hole built up with anything, so we finally hit on the idea of using a blast furnace cinder notch cooler or "monkey," as it is called. These are cylindrical copper water jackets with a 2-in. center hole for the flow of the slag. When inserted into the hearth jacket of the cupola flush with the outside and held firmly with braces they gave first-class service and eliminated all of our slag notch troubles.

We next found that our tap hole and breast would only last about 24 hr. and we were losing a lot of time each day draining the cupolas and putting in a new breast, besides making the work extremely difficult for the tapper. We overcame this difficulty by using a steel ladle teeming nozzle. These nozzles are about 8 in. in diameter, about 10 in. long and have a 1.50-in. hole, and are made of first-class fire brick. These were placed so as to be flush with the inside of the hearth and rammed tightly around with dolomite and tar. They had an average life of about 5 days when they had to be changed, the hole becoming too large due to the cutting action of the metal. The life of a lining averaged about 10 days. In all 5 different runs were made over a period of about 2 months. The operation was very irregular, a great deal of time being lost waiting on the open-hearth furnaces.

It was doubted at first whether the two cupolas would be able to supply sufficient metal for the four furnaces and it was expected that a large proportion of scrap would be used in the charges, but after the first day the original hot metal charge of 50 tons was adhered to. Even then the cupolas were on blast only on an average of 18 hr. out of each 24 hr. of possible operation. A delay report was accurately kept. An electric signal bell in the engine room was controlled from the tapping floor and both the tapper and the engine driver were required to keep a report of the number of revolutions ordered and the time blast was off. A report of the filling was kept by both the cupola foreman and the top fillers. This report was checked each day against the yard reports of material delivered to the cupola yard. The gross and tare weights of the hot metal ladles were kept by the weigh master and also entered by him on the open-hearth furnace charging sheets. All coke, limestone and pig iron were weighed before being taken to the cupola yard.

The fact that our coke was very high in ash and the importance of having a good liquid slag for successful continuous operation was mentioned before. The analysis of the coke and ash follow:

	Ash	Sulphur	SiO_2	Al_2O_3	CaO	MgO
Per cent	18.2	0.40	49.00	32.70	3.00	0.50

The limestone analyzed:

	SiO_2	Al_2O_3	CaO
Per cent	4.2	0.70	53.1

The regular cupola charge after 8 or 10 hr. was: 1200 lb. coke, 320 to 400 lb. limestone and 14,000 lb. pig. The slag analysis was fairly uniform at: SiO_2, 48.0; FeO, 2.0; Al_2O_3, 16.5; MnO, 5.0, and CaO, 28.2 per cent. With this analysis and figuring for a slag of approximately 50 per cent SiO_2 and 30 per cent CaO, we found it necessary only to add 1121 lb. limestone. As our charge was always between 320 and 400 lb. we were evidently desiliconizing to the extent that 250 lb. limestone would unite with SiO_2 in the above ratio or 208 lb. SiO_2 or 100 lb. silicon, equivalent to approximately 0.80 per cent Si in the pig iron. The analysis of the melted iron was remarkably uniform, always below 1 per cent silicon with the sulphur ranging from 0.50 to 1.00 per cent. Only two or three times did we run into a streak of high silicon pig iron, and then we were always careful to add more limestone. On one occasion at night two 40-ton trucks of 6 per cent silicon iron were charged by mistake. Only prompt addition of considerable fine fluorspar saved the cupolas

from being hopelessly bunged up with slag, due to it becoming extremely silicious and at the same time very viscous.

Summary of Delays for Total Campaign

Total number of hours	1,575
1st repairs to lining	68 hr.
2nd repairs to lining	51 hr.
3rd repairs to lining	89 hr.
4th repairs to lining	43 hr.
5th repairs to lining	75 hr.
Total delay for lining repairs	326 hr.
Total time blast off waiting on open-hearth	376 hr.
Total delays	702 hr.
Total operating time, or total time blast on	873 hr.

Production Summary

Total iron melted (pig to cupola yard)	13,210 tons	
Metal to open-hearth furnaces (net)	12,191.70 tons	
Metal to foundry	26.60 tons	
Recovery	12,218.40 tons	92.42 per cent
Scrap recovered as ladle skulls	661.53 tons	5.08 per cent
Losses in slag, etc	330.20 tons	2.50 per cent

Summary of One Blast—10 days

Total production, net weight of hot metal	2,601.6 tons
Total coke into cupola yard, actual yard weight	305.8 tons
Melting ratio	8.5 lb. iron to 1 lb. coke
Weight cold pig to cupola yard	2,713 tons
Ladle skulls, actual weights	80 tons
Losses	32 tons

Example of One 24-Hr. Run

Time lost, each cupola		6 hr. 30 min.
Net production hot metal		368.25 tons
Charges:		
No. 1, 29	Charge,	1,200 lb. coke
No. 2, 33		360 lb. limestone
		1,400 lb. pig iron
Melting ratio		About 10 to 1
Rate of melting		21 tons per hour for two cupolas

Considerably better results would have been obtained were it possible to dispose of all the metal the cupolas could melt. Nearly every 24 hr. the blast was off from 6 to 12 hr., sometimes for periods of 5 to 6 hr. each. Under these circumstances it was not safe to burden the cupolas too heavily. These delays were responsible for chilling and building up of the hearth, which was evidenced by the decreased amount of metal in the succeeding taps. The hearths were seldom ever clean after the doors were dropped, the accretions seemingly consisting of both metal and slag. Our greatest difficulty in the operation of the cupolas was in keeping the tuyeres open and preventing irregular melting. Although we were only using 20 out of the 40, and had increased their size to the limit of the shell hole, it was practically impossible to keep the melting evenly distributed. If several adjacent tuyeres were left unattended for a few hours, accretions and shelves would build up on that section of the tuyere zone which often as not would stay there until the end of the campaign, gradually as a rule getting worse instead of better. A blank of coke and several bags of fluorspar would sometimes clean out the melting zone but not always. These obstructions, which were formed, were always preliminary to slower driving and were usually responsible for a considerable loss of iron in the slag.

The writer is strongly of opinion that for heavy-duty work especially, a single row of large rectangular tuyeres with a slightly downward slope is the best type of construction. For this kind of work, also, the wind box should not be built onto the shell, as is the custom in so many foundry cupolas. A form of construction similar to the blast furnace bustle pipe should be followed, with each tuyere having a separate feed from the wind pipe. This allows the use of water to cool any hot spot that might show up on the melting zone. In heavy slagging cupolas, the water-cooled slag notch is no doubt a great help. A cooler with a 2½- or 3-in. hole is preferable. This hole may be reduced with clay to any size desired, the clay also neutralizing the chilling effect of the cooler on the slag. For a tapping breast which must withstand the cutting action of such large tonnages of metal, the fireclay nozzle will probably give the most satisfaction.

Cost of Operation

Going partially into the question of cost and the advantages of the hot metal over the cold stock charges, the cupolas operated on three shifts of 17 men each, comprising:

1 Foreman	$2.50	1 Electric lift operator	$2.00
1 Tapper	3.00	8 Stock men in yard	2.25
1 Assistant tapper	2.50	1 Locomotive driver	3.00
2 Chargemen	2.50	1 Switchman	2.50
1 Engine driver	3.00		

Total about $30 per shift or $90 per day.

As this crew was not engaged during the lining period or a total of 326 hr. for the entire campaign, this leaves 1249 hr. as time actually working or 52 days at $90 per day, or $4,680. This is the labor cost for melting 12,218 tons or 38c. a ton. This compares favorably with the practice at one large foundry with which the writer is familiar where they melt 72 tons per day of 10 hr. Here the charging and handling of the stock is all by hand and the cost per ton is approximately 45c. Adding to this cost of 38c. that of relining, cost of coke, limestone and incidental repairs, etc., brought our total melting cost up to about $1.00 per ton. Without going further into figures, it suffices to say that from the standpoint of the open-hearth department, after careful investigation it was decided that hot metal at any cost of remelting under $2.50 per ton was cheaper than using cold pig charges. To summarize some of the advantages:

The increased yield of steel would more than balance the cupola losses.

The increased production due to quicker heats was such that for one month the production was greater than any previous production when receiving hot metal from the blast furnace in full operation. This was due to hot metal being always available from the cupola, whereas the blast furnace only tapped every four hours and very often an open-hearth furnace would have to wait several hours between casts for metal. The more uniform grade of metal from the cupola was also an advantage.

The saving in limestone in the open-hearth charges due to the lower silicon content of the cupola metal, more than paid for that used as flux in the cupola itself.

The advisability of using cupolas to premelt the pig in basic open-hearth steel plants having no blast furnaces depends so much on local conditions that it could not be advocated as a general rule. Most plants using cold pig and scrap stock are very particular to secure a uniform grade of material, but even then the writer believes that, with a modern mechanically charged cupola, the increased production of the open-hearth furnace from the use of hot metal will considerably more than pay for the cost of operating such a cupola plant.

In 1914 about 89 per cent of the ocean-going tonnage of the world was propelled by engines deriving their energy from the combustion of coal. In 1921 Lloyd's reports that only 72.3 per cent of the (larger) tonnage depends upon coal for propulsion. Steam vessels using oil for fuel have increased from 2.62 per cent of the total to 20.65 per cent. Internal combustion engines now propel 2 per cent of the tonnage—more than four times the proportion prevailing in 1914.

The Wheeling Steel Products Co., sales subsidiary of the Wheeling Steel Corporation, announces that the vacancy created by the retirement of John Duncan as vice-president in charge of pipe and tin plate sales will not be immediately filled. Mr. Duncan's duties with the Wheeling Steel Products Co. have been assumed by other officials of the company.

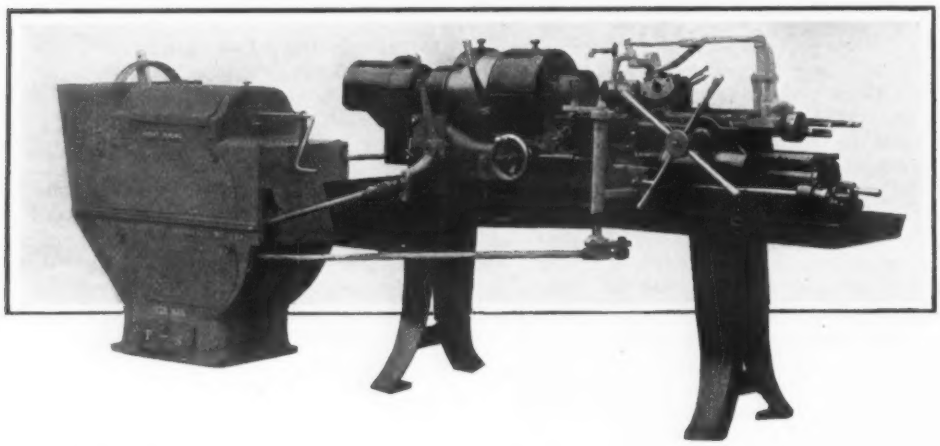
That pig iron is cheap is no wonder, according to the Pittsburgh *Press*. "THE IRON AGE and the rest of the iron and steel trade journals," it says, "are all right as far as they go, but not one of them has hit on the real reason why pig iron is at the lowest price since 1903, the reason being that it is the only thing not used in home brewing."

Hand Screw Machine Attachment

An attachment called the iron man, for use with hand screw machines and turret lathes, making them fully automatic in operation, has been placed on the market by the Pearson-Scott Co., Indianapolis.

The device is shown in the accompanying illustrations and consists essentially of a disk mounted on a frame and upon which there are flat cams. The cams make contact with rollers on the crossheads that are connected to the ends of reach rods the opposite ends of which are connected to different units on the machine. The attachment is driven through the worm shaft to periphery of the disk as shown. The speed is controlled by buttons placed on the ring gear and a countershaft of special design takes care of speed changes necessary for the various materials worked upon. In case of clogging of the parts or slipping of the belts on the machine a safety pin is provided to prevent injury to the mechanism. The cams are so placed on the disk that operations are performed in the proper sequence, one part being completed at each revolution of the disk. Locating the cams on the disk is a simple matter, as the shapes of the cams are stencilled on the sides of the disk as shown, and holes drilled so that a cam will not fit in any other than its proper place. Twenty cams are supplied with each attachment. The indexing cams are never changed and the reacting cam is intended to take care of coasting in the turret slide.

The iron man may be located at either end of the hand screw machine and may be used for driving simultaneously two machines doing the same kind of work. A stock feed unit is included which is adaptable to any screw machine, making a continuous feed and giving a stroke of 12 in. if desired. This unit is separate and distinct from the attachment as is also the turret lock and die setting unit which automatically locks and unlocks the indexing turret and sets the dies for chasing threads.



Cams Are So Placed on the Disk That Operations Are Performed in Proper Sequence. The attachment may be located at either end of the machine. Hand operation is not interfered with and attachment may be quickly disconnected

The Aluminum Bronzes

R. Guérin, reporter to the French Aluminum Commission, gives a résumé in *La Nature*, Oct. 16, 1920, of the properties, as far as they have been determined up to the present, of aluminum bronzes, or, as the French Standards Committeè has decided to term them, the copper-aluminum alloys.

According to an abstract in *Technical Review*, London, reference is made to the pioneer work of Henry Sainte-Claire Deville, and the recent researches of Guillet, Le Chatelier, de Fleury, and others, as well as to the researches on quenching and annealing that were carried out at the French Aeronautics Laboratory during the war by M. Breuil. The photomicrographic examination of forgeable bronzes cast by the Durville process (which gives perfectly sound ingots) reveals the presence of a hard constituent consisting of fine grains, embedded in a plastic mass. Tests made also showed that the fineness of grain of these metals contributed to a reduction in friction, while offering a resistance to wear superior to that of phosphor-bronzes. Under loads which would have cracked or destroyed all ordinary anti-friction metals, aluminum bronze rollers were subjected to protracted running tests without exhibiting appreciable wear. These alloys are also excellent conductors of heat, while retaining their mechanical properties at high temperatures. At 350 deg. C. a 90:100 bronze gave a tensile strength of 50 kg. per sq. mm., an elongation of 15 per cent, and an elastic limit of 31 kg. per sq. mm., the latter having slightly increased with the temperature. These alloys are non-magnetic, which makes them suitable for use in certain parts of rotors, where a high elastic limit is required.

The resistivity of a 10 per cent aluminum bronze has been found by M. Pécheux to be eight times greater than that of copper, and increases with temperature; at 630 deg. C. the figure for resistivity is doubled, and it approaches that of German silver.

It has been decided in France to mint coins of small denominations of aluminum bronze for issue by the Chambers of Commerce in place of the small notes now in use.

How the United States Steel Corporation organizes for safety and some of the concrete things done by it to attain it is outlined in an article entitled, "Safety Where the Bessemer Blows," by Louis Resnick, which occupies first position in the August issue of *National Safety News*. It is illustrated by 16 photographs and charts. The expenditures of the corporation for safety have increased from $595,649 in 1912 to $1,420,456 in 1920, the record year. As an illustration of how far the corporation will go to make safe conditions, mention is made of the window cleaner's track and cars, and other runways, built near the roof of a building in the National Tube Co.'s plant at McKeesport at a cost of $50,000.

Characteristics of Foundry Cokes and Slags

Analyses, Units of Value and Tests — Analyses and Value of Fluxes—Slagging— Nature of Slags and Value of Melting Process

BY Y. A. DYER*

COMMERCIAL coke is manufactured in the old-type "bee hive" oven and in the new-type "by-product" oven. The coking principles involved apply to both forms of manufacture—expulsion of gases from bituminous coals and "fixing" of the carbon residuum. That is, driving off by heat the rich hydrocarbons in an atmosphere from which air is practically excluded, and concentrating the amorphous carbon of the coal. The two forms of coking materially differ by reason of the methods employed as to gas disposal.

In the manufacture of beehive coke the rich volatile gases are permitted to escape from the oven into the open air, while the by-product or retort process reclaims these gases and condenses them into a tar and liquor form. By subsequent series of fractional distillation and concentration, valuable by-products are obtained from the tar and liquor in the form of creosote, sulphate of ammonia, benzol and other organic compounds and combustible gas.

A coal which contains less than 20 per cent volatile matter does not, under present coking methods in use, "cake" or fuse properly—hence is classed as non-coking coal. Should it contain more than 30 per cent volatile matter the porous structure of resultant coke will likely be so great that its wall structure will be too weak effectively to sustain or carry metal charges; or will at least permit a too free burning away of coke bed at the zone of fusion.

The presence of free (uncombined) or inherent (combined) sulphur in coals vitally determines their suitableness for the manufacture of coke—especially for foundry use; that is, whether the sulphur is largely mechanically free and volatile—in the form of iron pyrites (FeS)—or whether mixed in the ash in the form of calcium sulphate ($CaSO_4$). If the former condition prevails, much of the sulphur may be mechanically washed out of the coal at the mines, or volatilized in the oven and burned to SO_2 gas. Some sulphur may remain in the coke from this reaction as iron sulphide, but usually the major portion of the sulphur present will be disseminated in the coke ash as calcium sulphide (CaS), as a residue from the heat reaction on the gypsum ($CaSO_4$).

Typical Coke Analyses

Following analyses represent (in percentages) a fair average of chemically satisfactory foundry coke—(BH) representing beehive coke and (BP) by-product coke:

	Fixed Carbon	Volatile Hydro-carbons	Moisture	Ash	S	P
Eastern:						
(BH)	87.25	1.48	0.77	10.50	0.80	0.017
(BH)	88.00	1.00	0.50	10.50	0.80	0.018
(BH)	89.00	1.50	0.74	8.76	0.75	0.016
Western:						
(BP)	89.51	1.03	0.75	8.71	0.67	
(BH)	83.00	0.95	0.25	15.80	0.65	
Virginia:						
(BH)	91.54	1.70	0.25	6.51	0.70	0.002
(BH)	87.56	1.36	0.56	10.52	0.62	0.007
Southern:						
(BH)	89.15	1.32	0.35	9.18	0.65	
(BH)	88.00	1.07	0.60	10.35	0.75	0.030
(BP)	87.87	1.14	0.39	9.56	1.00	0.030

Both the quality and the effectiveness of coke may be expected to reflect the chemical and physical factors of the coal from which produced and the mode of its manufacture. It is particularly true in the South that the generally satisfactory foundry cokes are produced in the beehive oven. There seem to be exceptions to the rule in some sections. Mixtures of certain West Virginia and Pennsylvania coals produce a high-grade by-product coke. However, it would seem that there are certain superior physical and chemically combined constituents (as yet inexplicable) present in beehive coke for foundry use.

Possibly one of the basic causes of these virtues may be due to the fact that the coke is permitted to "ripen" or mature under cumulative moderate conditions which prevail during the coking period in the beehive oven, rather than being forced to yield to drastic influences in the superheated and rapid coking retort oven. In other words, it would seem that the carbonization and cementation processes are more uniform and complete under moderate conditions prevailing in the beehive oven.

Peculiar Characteristics of Coke

Some foundrymen are prone to condemn coke from outward appearances. Carbon deposits, in the form of "soot" or dark, "stringy hairs" are often classed as "jamb" coke or black ends. The writer has had numerous analyses made of such substances and in each instance the carbon content of the coke was 92 to 93 per cent. "Rusty" spots on coke are often classed as an indication of high sulphur. Their presence is traceable to iron oxide in the coke ash. Some cokes "clinker" freely and have a tendency to "gum" and interfere with the circulation of gases. This condition is controlled by the constituency of the coke ash. An ash low in alumina, and high in silica and iron oxide (iron silicate), will have a low melting point by reason of the basic effect of the iron oxide.

According to Richards, a typical iron silicate (Fe_2SiO_4) has a melting point of 1904 deg. Fahr. An ash high in alumina, high in silica and low in iron will have a high melting point. Any material increase in iron oxide and lowering of silica and alumina will lower the melting temperature. According to Richards, again, a typical iron-aluminum-silicate ($Fe_2Al_2Si_2O_{12}$) has a melting point of 2093 deg. Fahr.

Following analyses of coke ash are typical and illustrative of the varying composition of ash as related to fusibility. It will be noted that the nearer the ash approaches the composition of a typical aluminum silicate—54.2 per cent silica and 45.8 per cent alumina—the more infusible it will become. The nearer it approaches a typical iron-aluminum silicate—53.6 per cent iron and alumina and 46.4 per cent silica—the less infusible it will become. No. 1 ash is non-clinkering, No. 2 ash is fair and No. 3 ash is clinkering:

	No. 1	No. 2	No. 3
SiO_2	54.67	46.23	46.40
Al_2O_3	41.95	31.93	16.45
Fe_2O_3	Trace	14.54	18.15
CaO	1.82	5.04	11.80
MgO	1.46	2.26	4.63

Units of Value for Foundry Coke

Presence of high carbon and low ash in coke is not necessarily a guarantee that it will prove to be high grade for foundry purposes. These qualities are highly

*Birmingham, Ala.

desirable, but not to the exclusion of due consideration to structure and to undesirable elements. In addition to fixed carbon and low ash, other units of value are wall and cell structure, low sulphur and phosphorus. First grade cupola coke may be expected to possess adequate burden carrying qualities. That is, its wall structure should approximate, by volume, 52 to 54 per cent, and cell structure 48 to 46 per cent.

Charging and melting conditions should vary with the porosity of coke. If the coke should be too porous and weak, relatively smaller charges of metal should be used; if heavier and denser in structure, normal charges should be used. This is reflected in fuel costs per ton of iron melted. The fixed carbon may vary from 87 to 90 per cent; sulphur is not objectionable between 0.65 and 1 per cent; ash may be from 8.5 to 11 per cent. Shatter test should approximate 75 to 80 per cent; compressive, or crushing, test 300 to 400 lb. per cu. in. The constituency of the coal ash, carbonizing and cementation processes will determine the wall structure of the coke; the volatile hydrocarbon content of the coal will influence the cell structure, or porosity, of the coke.

Tests to Determine Coke Characteristics

The apparent specific gravity of coke is the ratio of the whole coke, inclusive of pores, to that of an equal volume of water; real or true specific gravity is based on coke substance exclusive of pores—the carboniferous elements, together with the ash and other constituents. Apparent specific gravity is of most importance, and ranges from 0.80 to 1.25; true specific gravity from 1.25 to 1.90. Hardness test ordinarily ranges from 2.50 to 3, and is a very important test for coke. The kindling temperature of coke is about 1292 deg. Fahr.

A simple method to ascertain shatter test is to place 100 lb. of coke in a metal container, hoist it 6 ft. and drop four times on a firm metal or concrete surface. Put the shattered coke over a 2-in. screen. That portion which does not pass through the meshes of the screen represents the percentage of "shatter."

Compressive or crushing strength is obtained by placing a 1-in. cube of coke in a specially constructed machine and crushing it until it breaks. Pounds pressure to cu. in. is registered by the machine.

The cell and wall structure are obtained as follows: cut 1-in. or 2-in. cubes of coke from a fair average sample, and dry thoroughly by heating. When cooled, carefully weigh and note; then immerse the cube or cubes in distilled water and place under air receiver. Exhaust the air to force the water into cells; remove cube or cubes, weigh again and note. Difference in weight between dry coke and water filled coke, equated to apparent specific gravity of the coke, represents the aggregate cell space; the remaining percentage will represent the wall space.

Fluxes for Foundry Use

Most fluxing materials occur in carbonate form. That is, their elements are in combination with carbon and oxygen. Once heated to their critical temperatures, the carbon and oxygen are expelled, or pass off as carbon dioxide gas, leaving as a residuum an oxide and small percentages of impurities. The oxides form an active base for fluxing and holding in solution, or neutralizing, the harmful effects of impurities which may be present in gangue or slag.

Calcium.—The most abundant form of calcium is the carbonate $CaCO_3$, or lime rock. When pure it is white or gray in color, though impurities of iron compounds and organic matter may alter the shading to red, yellow, blue or black. Calcite is crystalized limestone, and is a pure form of calcium carbonate. Marble is a hard crystaline limestone, and the crushed "marble spalls" are often used to good advantage as a flux. Oyster shells are also very pure calcium carbonate and constitute a good flux. By weight, 56 per cent of calcium carbonate forms the oxide, or effective flux, and 44 per cent is driven off as carbon dioxide gas—decomposition being effected at a temperature between 1500 and 1600 deg. Fahr. It requires 818.7 B.t.u. to decompose 1 lb. of limestone.

Magnesium.—One of the most abundant forms of magnesium is magnesium calcium carbonate ($CaMg(CO_3)_2$), or dolomitic limestone, closely resembling lime rock and marble. By weight, 47.6 per cent of the carbonate ($MgCO_3$) forms the oxide, or effective flux, and 52.4 per cent is driven off as carbon dioxide gas. Decomposition of dolomite is effected at a temperature between 1100 and 1200 deg. Fahr. As a flux, magnesium oxide is 1.4 times more effective than calcium oxide.

Fluorine.—This is the most active of all known fluxing elements; it forms an extremely fluid slag and will dissolve anything. Fluorine enters widely into combination with other elements—especially calcium. In this form it is known as calcium fluoride (CaF_2), or fluorspar. No oxide of fluorine is known. On account of its high expense, compared with limestone and dolomite, its use is very much restricted in the foundry.

Satisfactory Flux Analyses

Following analyses are given as information in checking percentages of desirable and undesirable elements in fluxing materials. Each specimen submitted approximates first-grade in respect to percentage constituency of fluxing elements. The active bases—calcium oxide, magnesium oxide and calcium fluoride—are desirable; the impurities—silica and alumina—are undesirable in large percentages:

	CaF_2	CaO	MgO	SiO_2	FeO and Al_2O_3
Fluorspar	92 to 98	....	...	8 to 2.00	...
Limestone (Eastern)	.....	53.00	3.86	0.82	0.80
Limestone (Eastern)	.....	54.34	0.72	0.70	0.58
Limestone (Alabama)	.....	49.00	8.73	2.00	0.70
Limestone (Alabama)	.....	53.00	1.15	2.10	0.79
Dolomite (Alabama)	.....	31.00	20.50	5.00	3.74
Limestone (Texas)	.....	54.74	0.38	0.28	0.40
Oyster shells	.....	55.00	0.10	0.50	0.15
Marble spalls	.....	54.00	0.20	0.60	0.20

Slagging

Strictly speaking, slag is a fluid or semi-fluid mass of matter which forms at a high temperature, and separates from other matter present according to relative density or specific gravity. Commonly referred to, slag is the dross, scoria or cinder created in the smelting and refining processes incident to the production of metals. By reason of the presence of large quantities of infusible acid matter in the formation of certain slags, it is necessary to supply a basic material to create fluidity, neutralize the acids and hold in solution certain oxides and sulphides, thereby rendering them harmless to the molten metal. Such process is termed fluxing and slagging, and the flux material used is basic in nature; the base and acid neutralize each other. That is, by a series of changes they mutually destroy each other's characteristic properties, and produce a compound known as a salt.

Many foundrymen prefer to ignore the necessity of fluxing the cupola gangue. Inasmuch as all materials charged in the cupola pass into either metallic, slag or gaseous form, it is evident that all the non-volatile matter of the charges, including any rust (iron oxide) from corroded scrap metal, will pass to the slag. It would, therefore, appear very important to form a slag which will have a greater attraction for harmful impurities than the metal possesses. The heat of formation of a cupola slag (calcium-aluminum-silicate) is very high, and for that reason the high heat retained in it serves as a protection to the metal bath in the cupola and keeps the metal hot. It is well to retain a

good portion of the slag in the cupola during the melting process.

Nature of Slags

A cupola slag is essentially a calcium-aluminum-silicate—largely composed of lime, silica and alumina, with small percentages of iron oxide, manganous oxide, alkalies and calcium sulphide. Acid slags are viscous in nature and basic slags are fluid. The presence of a comparatively small amount of iron oxide and iron sulphide in a slag creates a greenish tinge; large amounts create a black viscous slag. Such latter condition is a fair guide to indicate that heavy oxidation of metal has occurred. An effective method of checking oxidation is to have slag analysis determined—especially for ferrous oxide.

In normal working cupolas, iron oxide in the slag should not exceed 7 to 8 per cent; it will vary between 4 and 8 per cent. Iron oxidizes in the cupola chiefly as ferrous oxide and passes to the slag; silicon oxidizes as silicon dioxide; sulphur combines chiefly as calcium sulphide and manganese sulphide; manganese oxidizes as manganous oxide and combines with sulphur as manganous sulphide. Iron oxide and manganous oxide are active bases—hence readily combine at high temperatures with acids present; therefore, if they are not satisfied by acids present in charges, they are likely to attack the silica (acid) bricks, or cupola lining.

Two slags produced under specific conditions have been analyzed. Metal charges for each heat consisted of like material—1500 lb. iron and scrap, 12 lb. of 80-per cent ferromanganese and 150 lb. intermediate coke. For heat No. 1, 30 lb. of limestone was used as flux; for No. 2, 50 lb. of stone. Slag from No. 1 heat was of dark brownish color and viscous in nature; from No. 2 heat it was more fluid and of greenish tinge. For No. 1 heat the coke bed was found to be too low; for No. 2 heat it was normal. Following slag analyses were reported for the two heats:

	No. 1 Per Cent	No. 2 Per Cent
SiO_2	48.10	47.60
Al_2O_3	12.10	16.12
CaO	21.50	22.90
MgO	1.68	1.71
FeO	11.63	7.46
MnO	4.94	5.48
S	0.05	0.15

Metal analyses from these two heats were reported as follows:

	No. 1 Per Cent	No. 2 Per Cent
Graphitic carbon	2.80	...
Combined carbon	0.60	...
Total carbon	3.40	...
Silicon	1.65	1.41
Sulphur	0.072	0.04
Phosphorus	0.74	0.69
Manganese	1.13	1.05

Slag from a highly oxidized heat of metal on the same test was also analyzed, showing ferrous oxide 33.18 per cent (metallic iron 25.80 per cent). Castings from this heat contained prolific blow holes, segregation and cold-shuts. The slag was black and very viscous in nature.

The acid to base ratio in each of the two slags reported above is entirely too high for satisfactory fluxing of sulphur by the "lime route." Fortunately, a low sulphur coke (0.60 per cent) was used and a good percentage of ferromanganese, otherwise the iron would likely have been excessively high in sulphur. An acid to base ratio of 0.90 or 0.92, or base to acid of 1.1 or 1.08, is recommended for effective desulphurization. The following theoretical slag composition will serve as a goal to approach:

SiO_2	32.00 per cent
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Alkalies	1.50 per cent

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Unusual Ones Not Due to Fatigue—Krupp Repeating Impact Testing Machine

Peculiar failures in structural steel parts, as well as the results of a special impact testing machine, are discussed in the monthly organ of Krupp's, Essen, Germany, *Krupp'sche Monatshefte*, June, 1920, by two writers, an abstract of which is published by *Technical Review*, London, as follows:

Structural steel parts often do many years' service in the machine or structure, and then suddenly fracture, though there is no evidence of overstressing. Fracture takes place without appreciable deformation, or elongation or reduction of area at the fractured portion. As an example of parts subjected to the stresses associated with this type of fracture, the writers mention the recurring impact or shock stresses of railroad vehicle axles due to the rail joints, the alternating direction of the forces of crankshafts and similar changes in parts of high-speed machines caused by the oscillating masses, or by rotating portions that are not properly balanced. These stresses are generally additional to the tensile (or compressive), bending and torsional stresses which occur simultaneously.

The writers contend that these fractures must not, as is generally done, be regarded as fatigue fractures, because modifications in the structure of the steel, and, consequently, changes in the strength, are caused by these "permanent" or "secular" stresses. The fractures are probably often due to imperfect elasticity of the steel. Thus, taking a bar under bending stress, small permanent deformations may be set up in the outermost fibres, these deformations eluding detection with all present methods of accurate measurement. Where the number of loads involved is small, these deformations are unimportant; but if the loads change very often in magnitude or direction, the result is that fine and scarcely perceptible cracks occur, and gradually progress into the material as the result of further secular stressing. The cracks produced give to the material a certain slight mobility, and the cracked surfaces rub on each other until they are smooth, and, finally, the portion of the section still adhering breaks. Illustrations are given of fractures of this kind taken from crankshafts, railroad and tramway axles, locomotive cranks, etc., showing the smooth portions and the last adhering part. Most of the fractures proceed from notches or acute angles acting as notches, re-entering angles, or sudden changes of cross-section.

After referring to the work of Wöhler and others in regard to alternating stresses, which they state only gives qualitative information, the writers describe the repeating impact testing machine used by Krupp's, and the results obtained. The machine has 4.185 metric ton tup, with a normal drop of 30 mm., and is capable of delivering about 85 blows per min. After each blow the specimen is turned through either 180 deg. or through 1/25 of the total revolution, special gear being fitted to the machine for the purpose. A wide range of tests were made with specimens having different forms of notches (round, acute, and obtuse angled), and of different composition; full details of these are given in the paper. The tests made show the relations between the resistance of steels to permanent or repeated stresses, and their yield point. Many of the fractured test-pieces showed the same peculiar structure as the broken part from which they were taken.

Finally, it is stated that machine parts which have been case-hardened, and which are subjected to continuous stresses, show a long life—this result according with the results of the repeated impact test.

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ERIE LEASES ITS REPAIR SHOPS

Railroad Expects Lowered Costs and Avoids National Agreements

What promises to prove a most interesting experiment is the reported leasing by the Erie Railroad to the Railway Service Corporation of the Erie repair shops at Marion, Ohio. The men back of the Service Corporation are in the main well known manufacturers of Marion, and are members of the Marion Employers' Association, which is an open-shop organization.

It is reported that, upon appearing for work at 7 o'clock Monday morning, the erstwhile employees of the Erie shops were offered their old jobs by the new management, at their old rates of pay. Inasmuch, however, as the Railway Service Corporation is not in any sense a common carrier, its operations will be entirely outside the jurisdiction of the Railway Labor Board, and hence such matters as the long-disputed national agreements, the eight-hour day and various other features which have attended the operation of railroads in the United States for some time, will not necessarily apply under the new regime.

There has already been trouble at Marion, although this antedates the new arrangement, and was caused by the announcement on the part of the Erie Railroad that the ten-hour day would be resumed, overtime would not be paid for Sunday work and each employee should submit to physical examination. Resulting upon this announcement, the force of 400 to 500 men had dropped off nearly half. Consequently it was a much reduced force which came on the new job.

It is said that a plan somewhat similar to that which has been put into effect at Marion has been in vogue for several months in the Erie repair shops at Hornell, N. Y., where approximately 1000 men are reported engaged in locomotive repairing. It is also reported that negotiations are under way which, if successful, will turn over the Silvia, Ill., shops of the Rock Island Railroad to a similar outside corporation for operation.

But it is stated that, if a general tendency along this direction is noticed, the Railway Labor Board may take the view that an effort is being made to sidestep or violate the Esch-Cummins act, under which the railroads are now operating. The new company at Marion has been incorporated, the papers being filed with the Secretary of State at Columbus last Saturday, but nothing was made known of the plan until the men reported for work Monday morning.

To Hold Hearings on Patent Bill

WASHINGTON, Aug. 16.—The compulsory work and patent bill, after coming up in the Senate for consideration, has been referred back to the Committee on Patents, with instructions that hearings will be held on the measure. It is known as the Stanley bill and was introduced at the request of the Secretary of War because foreigners were obtaining inventions relating to American ordnance and selling them to German interests. The patent committee of the American Engineering Council has reported that the bill introduced a dangerous innovation into the law, which was not intended by those who drafted it, and furthermore, it would not obtain the result desired. Members of the patent committee will present their case before the Senate committee.

A 90 Per Cent Duty on Imported Army Supplies

WASHINGTON, Aug. 16.—The iron and steel trade is interested to a certain degree in the resolution passed last week by the House providing a duty of 90 per cent of the original value in the United States on reimportation of army supplies shipped abroad during the war to the American Expeditionary Forces. Most of the material is in France, where much of it, it is stated, after being bought by the French Government, was sold and fell into the hands of speculators, who have been dumping it in this country. While there is considerable steel included in these supplies it is high carbon tonnage, for which there is practically no market here at present and with no prospects that there will be soon, if at all. However, it has been stated by steel men that some of it, such as shell billets, could be used for making axles, reinforcing bars, etc., although perhaps 80 per cent of it, it is estimated, would have to be remelted as scrap. The measure now is before the Senate committee on finance, which will begin hearings on it in a day or so, according to present plans.

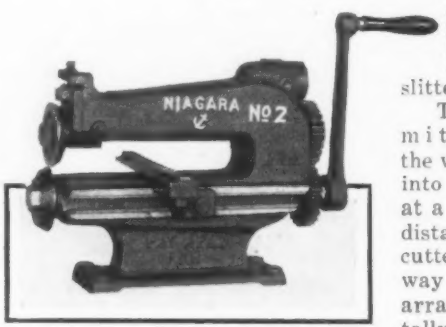
Consolidation of Tractor Plants

The Post-Whitney Co., a consolidation of the Post Tractor Co., Cleveland, the Whitney Tractor Co., Upper Sandusky, and the Chief Motor Co., Port Huron, Mich., has perfected production and distribution plans calling for the manufacture and sale of 30,000 tractors within the next 16 mo. The Post plant at Cleveland will be used to build transmissions. The Chief Motor plant at Port Huron will be devoted to the manufacture of motors for the Whitney tractor. The other parts and general assembly will be done at the Whitney plant at Upper Sandusky.

The officers of the company are: A. B. Whitney, president and treasurer; Harry S. Erd, vice-president and general manager; Ralph Blue, secretary. Maurice F. McCarthy has charge of production and C. E. Grove is manager of distribution, which includes sales, service and advertising.

Splitting Gage for Rotary Shear

A new slitting gage for a rotary sheet metal shear is being placed on the market by the Niagara Machine & Tool Works, Buffalo. The accompanying illustration shows the application of the gage to a No. 2 Niagara slitter.



The Gage Is Set by Turning a Nut on the Gage Block

The gage permits of keeping the work being fed into the machine at a predetermined distance from the cutters. The guideway of the gage is arranged horizontally on the front face of the machine and is integral with the frame. A guide block is movable longitudinally in the guideway and may be clamped thereto at any point. Detachably secured to the upper part of the block there is an angle-iron wear strip arranged transversely of the machine and this fits into an abutment that is made integral with the guide block. When circle and ring cutting the guide block and its wear strip may be quickly removed by sliding them forward until the head of the clamping bolt is disengaged from the guide. Ordinarily, however, it is sufficient to merely slide the gage rearwardly out of the way. There is but one adjustment to make in setting the gage, namely, turning the nut on the gage block. The gage cannot be thrown out of adjustment when accidently moved along the guide and the large area of contact between the block and the guide eliminate the tendency of the block to slip longitudinally after the adjusting nut has been tightened.

The No. 2 Niagara slitter has been recently redesigned and is now ready for the market equipped with the patented slitting gage as shown.

Wage changes in June, in the British metal, "engineering" and shipbuilding industries, affected 350,500 workers, according to *Commerce Reports*, and showed a decrease in weekly wages of £90,850 ($340,700, at $3.75 per £). Thirty-five hundred workers received advances, amounting to £1,350 weekly; 347,000 sustained decreases, amounting to £92,200 weekly.

First Reductions in Iron and Steel Rates

Bearing of Rock Island Action on the General Movement—Carriers Agree to 25 Per Cent Differential on Steel for Export

WASHINGTON, Aug. 16.—Much interest has been shown in efforts being made by the Chicago, Rock Island & Pacific Railroad to reduce freight rates on iron and steel products from the Chicago district to the important implement manufacturing towns of Rock Island and Moline, Ill. The situation is apparently local, but there is the possibility of the movement expanding and bringing down the iron and steel rate structure throughout the country. It is a matter of history that a break in rates in one section often is followed by a widespread reduction. Moreover, there is an increasing disposition on the part of carriers to lower rates voluntarily, recent instances being the decision reached at New York last week in favor of a 25 per cent differential on steel for export and the cut in rates on grain for export from points on Lake Erie. The iron and steel trade is becoming more active in urging rate reductions as necessary to lower costs of production and to stimulate demand. This attitude of producers has been particularly noticeable in and around the Pittsburgh district. Thus the move made by the Rock Island may be an additional influence toward a general reduction in iron and steel rates.

First Reduction Disallowed

The Rock Island has made two attempts in the direction of lower freights. Its first move was checked by the action of the Interstate Commerce Commission last Wednesday in suspending the tariff which would cut rates by approximately 15 per cent on a general list of semi-finished and finished steel products from Chicago to Rock Island and Moline, the tariff having been filed to become effective Aug. 10. The suspension was made on the strength of a complaint of the Illinois Steel Co., made in view of the fact that the reductions first proposed would not apply to Gary, Ind., where the steel company has plants. The reduction was forbidden the Rock Island in connection with the Elgin, Joliet & Eastern Railroad, because of a technical error, the carrier having published rates from Chicago and South Chicago to Rock Island and Moline which were lower than rates from intermediate points, including Gary, Hammond and Indiana Harbor, Ind. This was in conflict with the fourth section of the act to regulate commerce, which does not permit lower rates for a longer than a shorter haul over the same lines in the same direction. Upon notice from the commission that the tariff had been suspended from Aug. 10 to Dec. 8 pending investigation and hearing, because of this violation, the Rock Island made application last Friday to be permitted to apply the lowered rates from Gary and other Indiana points as well as from Chicago and South Chicago so as to correct the error made and to come within the provisions of the fourth section. The present rate on shipments of finished steel from Chicago to Rock Island and Moline, towns which adjoin each other, is 17c. per 100 lb., and the proposed tariff would reduce the rate to 14.5c. per 100 lb., a cut of 14.7 per cent.

The reason for the action of the Rock Island is said to have been that it has been losing business to the Chicago, Burlington & Quincy Railroad, and attempted to place rates on the same levels as those maintained by the latter. In making its proposal, the Rock Island called attention to the fact that the rates over the Burlington are lower than on any other line in Illinois. The Burlington has made one or two efforts to bring its rates up to the level of those on other lines, but for one reason or another the orders of the commission have made that impossible.

Attitude of Commerce Commission

The policy of the commission toward rate reductions has not been as favorable as shippers had hoped. Chairman Clark has written a number of letters pointing out that the necessities of the carriers are so great, by reason of high operating expenses, that even a temporary loss of revenue would be serious. The commission has suspended various tariffs carrying reductions, but at present is not following this policy so closely. After holding the matter up a few days, it permitted Henry Ford to make a reduction of 20 per cent in rates on the Detroit, Toledo & Ironton Railroad, which some traffic men have felt may tend to bring down rates throughout the Central Freight Association territory, even though the D., T. & I. line is not important from the standpoint of mileage.

The need of cutting costs of production and of stimulating business as quickly as possible is back of the movement for lower freights on steel. While recognition is given to the financial needs of the railroads, it also is pointed out that the increased traffic that will be developed by lower rates will result in a greater net return to the carriers. Reductions that have been made bear out this contention and encouragement has been found in the improvement in the railroad situation. Net operating income was $51,778,000 for June, 1921, or $14,697,346 more than in May. The earnings for June, on the basis of the tentative valuation fixed by the Interstate Commerce Commission for rate making purposes, would mean an annual return of 3.1 per cent compared with 2.4 per cent the previous month. Tabulations show, however, that the railroads fell short $47,295,000 or 47.7 per cent of earning the 6 per cent contemplated by the act. June showed the largest earnings for any one month since November, when the net operating income was $54,343,793. Increased efficiencies, together with better control of expenditures, have been an important factor in the improved showing. At the same time significance is given to the fact that the volume of traffic has become greater where rates have been reduced, while traffic carrying rates held to be excessive or rates which it has been proposed to increase further has shown a further slump in movement. Iron ore from the Lake Superior ranges is an example.

Reduced Freight Rates for Export

American steel exporters have probably succeeded in obtaining reduction of 25 per cent in railroad freight rates on export shipments. Efforts toward this end have been made for several months and culminated in a final hearing in New York on Friday, Aug. 12, at which the United States Steel Products Co., the Consolidated Steel Co. and other steel exporters made pleas to representatives of the Trunk Line Association for a 33 1/3 per cent preferential export differential, this being the differential that prevailed before the war. The Trunk Line Association agreed to a 25 per cent differential and its recommendations have gone to the Interstate Commerce Commission, which is expected to give its consent, so that the new rates may go into effect some time between Sept. 1 and 15.

YOUNGSTOWN, Aug. 15.—Iron and steel exports from the Youngstown district will be benefited by a 25 per cent freight reduction agreed upon last week at conferences between manufacturers and the railroads in Chicago and New York. The reductions will affect export business only and the new rate to tidewater ports will be three-fourths of the domestic charge. Details, such as differentials, are to be worked out, after which tariffs will be filed with the Interstate Commerce Commission at Washington for approval. Trade competition in foreign field, chiefly England and Belgium, forced the

reduction, said representatives of the producers attending the conferences.

The Trunk Line Association called the meetings to discuss a "proposal to establish rates on articles of iron and steel manufacture, structural iron and steel, billets, blooms and related articles, pig iron, new iron, steel rails and cross ties, from Trunk Line and Central Freight association territories to Atlantic ports, for export on a basis of 25 per cent less than present domestic rates."

Current freight rate from Youngstown to seaboard is 42c. per 100 lb. on bars, plates and sheets, or 40 per cent above the 30c. rate effective prior to Aug. 25, 1920. Under the proposed 25 per cent cut on export tonnage, the rate will be 31.5c. On billets the present charge is $7, the proposed rate $5.25 and the original rate $5.

Shippers originally urged a 33 1/3 per cent reduction in rates on export steel, a differential which in times past existed between domestic and export tonnage. The proposed reduction will place Valley steel makers on a more favorable competitive basis with foreign makers.

Railroads Need Not Do Interchange Switching Within Plants

WASHINGTON, Aug. 11.—The Interstate Commerce Commission has handed down a decision that the railroad line operated by the Whitaker-Glessner Co. at its steel plant at New Boston, near Portsmouth, Ohio, is a plant facility over which the Baltimore & Ohio and Norfolk & Western cannot be required to perform interchange switching within the plants. The commission also held that placing of cars on interchange tracks within the plant constituted delivery at the industry at the line haul rate. A further holding was that the refusal of the trunk lines to perform interchange switching within the plant or to make in the absence of this service an allowance in money was not unreasonable, unduly discriminatory, or in violation of the fourth section of the act to regulate commerce. In consequence the commission dismissed both the complaint and the accompanying supplement.

Unreasonable Rates on Brass Products

WASHINGTON, Aug. 16.—Making a tentative report in the case of the West Virginia Metal Products Co. vs. the Baltimore & Ohio Railroad, et al, Examiner Henry C. Keane has recommended to the Interstate Commerce Commission a holding that rates on brass sheets, rods, wire and tubes from Fairmont, W. Va., to Flint, Mich., Cincinnati, Detroit, St. Louis and Toledo are unreasonable to the extent that they exceed the rates on like commodities from Pittsburgh. A similar recommendation is suggested as to the same points of origin and destination on less than car lot shipments of copper and brass sheets, rods, wire and tubes. The report also takes the view that the rate on the commodities named are unusually prejudicial in favor of the Pittsburgh competitors of the complainant. Points to which the rates were held to be unreasonable are those in which the complainant hopes to do the most business. Adoption of the report would cut off the third and fourth class differentials of 4c. and 3c. per 100 lb. now imposed against traffic from Fairmont to the destinations mentioned.

The New England Foundrymen's Association held its annual summer outing Wednesday, Aug. 10, at the Pomham Club, East Providence, R. I., approximately 125 attending. Charles T. Colvin, Colvin Foundry Co., Providence, R. I., chairman, and Charles E. Andrews, Whitehead Brothers, Providence, members of the Providence reception committee, met the association members at the New Haven station, where automobiles were taken to the club. A luncheon was served and a Rhode Island clambake at 2 o'clock, C. S. Lovell, Walker & Pratt Mfg. Co., Watertown, Mass., president of the association, presiding.

Foundrymen's Association Prepares Index of All Transactions

The American Foundrymen's Association, C. E. Hoyt, secretary-treasurer, Marquette Building, Chicago, has issued a complete index of the transactions of the organization. As stated in the preface of the index, a vast amount of valuable information has been contributed to the literature of the foundry industry, but its usefulness is seriously impaired by its inaccessibility to the majority of readers. The annual index of the transactions of the American Foundrymen's Association, as well as the volume of indices of the trade papers, afford a means of finding articles appearing in a limited period of time, but are of little assistance to the reader who requires an extensive list of references on a particular subject. Unless a person has unusual facilities at his command the great library of foundry facts is closed to him. For this reason the members of the board of directors in session at Pittsburgh, Dec. 9, 1919, authorized the secretary to engage an experienced librarian to prepare a page to page index of all available volumes of the transaction. The index recently published is the outcome of this action of the board.

In cross-indexing the text matter of technical articles, an effort has been made to include all headings under which the reader might reasonably expect to find the desired information. For instance, reference to a discussion on modern methods of cleaning gray iron castings will be under "Cleaning," "Gray Iron," and "Castings." The tendency was to err on the side of "over-indexing" rather than to cross-index too sparingly. For the convenience of those who identify papers by the names of the writers, the authors' index has been separated from the subject index and appears near the end of the book. The book is 6 x 9 in., contains 190 pages, and is bound in the same style as the annual transactions of the organization.

Revised Federal Tax Bill

WASHINGTON, Aug. 16.—Decided departures from the existing law are carried in the revised tax bill, introduced in the House yesterday, and proposed for passage during the present week, after which Congress hopes to recess till Sept. 19. According to Treasury experts and Republican leaders in the House the measure will yield approximately $1,500,000,000, or about $350,000,000 less for the current fiscal year than would be obtained from the law as it now stands. Supporters of the measure are of the opinion that the amendments drafted will simplify the task of collecting taxes and have made readjustments that are intended to provide a more equitable distribution of the assessments and give relief to the public and to business generally. Underlying the decision to cut the levies are the plans to reduce Government expenditures and by refunding the $170,000,000 of war savings securities and Pittman act certificates coming due, so that it will be possible to lower the Government's fiscal requirements from $4,550,000,000 to $4,034,000,000. Secretary of the Treasury Mellon has estimated that receipts amounting to $857,643,000 may be expected from customs, salvage and other miscellaneous sources, and that $176,357,000 or more will be obtained by reason of the overlapping of receipts collected under the law as now drawn and partly by recovery of back taxes. With this calculation in mind, $3,000,000,000 has been left for collection from the normal income tax, income surtaxes, back collections of income and profits taxes and from miscellaneous internal revenue.

The revised bill authorizes the Secretary of the Treasury to settle disputes over back taxes without resort to the courts. It is proposed to establish a tribunal to pass upon claims and the time for their settlement would be reduced from five to three years, unless extension is ordered by the Secretary. It is the belief of officials of the Treasury that this will make much easier the collection of taxes now in dispute, estimated to total approximately $1,500,000,000.

Advantages of American Valuation Plan

Puts Foreign Sellers on One Footing and Prevents Undervaluation, While Neutralizing Depreciation in Currencies Abroad

WASHINGTON, Aug. 16.—One of the statements submitted to the Senate Finance Committee in connection with the tariff bill is by J. F. Zoller, General Electric Co., Schenectady, N. Y., and relates to the American valuation plan. Mr. Zoller is a member of the executive committee of the American Valuation Association, 304 Madison Avenue, New York, and associated with him on that committee are D. W. Jayne, the Barrett Co.; John A. Matthews, Crucible Steel Co. of America; Charles F. Rockwell, Miller Brothers Cutlery Co.; H. J. Strugnell, Remington Arms Co.; Stanley Williamson, Linde Air Products Co., and others. Mr. Zoller's argument is in large part as follows:

Depreciation of Foreign Currency

"In studying this matter we have prepared some figures showing the value of currency of Great Britain, France, Germany and Japan both before the World War and at present. The table comprising these figures is herewith submitted:

Country	Money Unit	Value in U. S. Money July 1, 1914	July 1, 1921
Great Britain	pound sterling	$4.8665	$3.73
France	franc	$0.193	$0.08
Germany	mark	$0.238	$0.013
Japan	yen	$0.501	$0.481

"It shows among other things that on July 1, 1914, the German mark was worth in United States money $0.238, but on July 1, 1921, the same German mark was worth in United States money only $0.013; that in 1914 an ad valorem duty of 33⅓ per cent imposed upon the foreign value of a German article costing 150 marks would amount to $11.90, but to-day, due to depreciation of the German mark, the duty at the same rate would amount to much less than that.

German Wages One-Third Pre-War

"In 1914 skilled laborers in Germany received about 8.7 marks per day, equivalent at that time to about $2.09. In January, 1920, (I have not the figures for 1921) such skilled laborers received the equivalent of 73 cents per day, which amount if converted into marks at the rate of exchange prevailing on July 1, 1921, would mean about 56 marks per day. Other things being equal, it follows that an article costing 150 marks in 1914 would cost about 7 times that amount, or 1050 marks, in 1921; 1050 marks in 1921 would be equivalent to about $13.65. An ad valorem duty on this amount at 33⅓ per cent would amount to only $4.55, as against $11.90, the duty that would be collected at the same rate in 1914.

"But there is another important factor in the situation. Wages in Germany, measured in terms of United States money, have gone down materially since 1914. In 1914 skilled laborers in Germany received the equivalent of $2.09 per day. In January, 1920, they received the equivalent of only about 73 cents per day, notwithstanding the fact that they received a much greater number of marks per day. In the United States, on the other hand, wages have materially advanced during the same period. This is shown by the following table:

Employment	1914	1920
Bricklayers	$5.59 per day	$9.60 per day
Laborers	2.50 per day	5.58 per day
Carpenters	4.33 per day	8.27 per day
Painters	4.16 per day	8.33 per day
Plasterers	5.44 per day	9.22 per day

NOTE.—The figures used herein as regards wages here and in Germany are taken from pages 9, 22 and 74 of bulletin entitled "Wages," prepared for the Ways and Means Committee of the House, dated 1921.

"The ad valorem duty, therefore, instead of being made less than it was in 1914, as it certainly would be if imposed upon the foreign value to-day at any reasonable rate, should be made more because of the difference in labor costs between this country and Germany to-day as compared with 1914.

"From the foregoing it seems obvious that an ad valorem duty imposed in 1914 upon foreign value at a rate entirely adequate at that time would constitute practically no protection at all to-day against German importations.

"If we continue the levying of ad valorem duties upon foreign value, we must, in order to get adequate protection against German importations, make the rate so high as to constitute practically an embargo against those countries whose currency has not been much depreciated. In any event protection against Germany to-day under our present system probably means a prohibitive duty against many of the other foreign countries.

Fluctuations in Duty Avoided

"If we cannot impose ad valorem duties to-day as a practical matter upon foreign value and must impose ad valorem duties, then it would seem that the only alternative is to impose such duties upon the American value instead of the foreign value. The American valuation plan has the following advantages:

"1. If our ad valorem rates are applied upon the American value the duty will not fluctuate because of the fluctuation of foreign currency. This is very important, because if we should impose to-day an adequate ad valorem duty based upon foreign value, such duty automatically might become inadequate, due to further depreciation in the foreign currency, or it automatically might become prohibitive should the foreign currency recover.

Advantages to Consumer

"2. The American valuation plan would result in two distinct advantages to the American consumer, which advantages could not be attained if our ad valorem duties were imposed upon foreign value.

"(a) It is a means of securing more revenue from those countries whose costs of production are low than would be secured if the duty were imposed upon foreign value. Under the American valuation plan an article imported from China, for example, would be subjected to the same duty as a similar article coming from England, whose costs of production are much higher. This additional revenue from China and other countries whose production costs are low is secured without imposing a corresponding burden upon the American consumer. The sale of the article from England in this case establishes the price to the American consumer. Imposing more duty upon a similar article from China does not increase that price, but it does reduce the profit of the Chinese merchant and makes it more comparable with the profit of the English merchant. Any tax law that equitably produces more revenue without imposing a corresponding burden upon the consumer is almost an ideal tax law. The American valuation plan, therefore, is of material benefit to the consumer from this standpoint.

"(b) The American valuation plan tends to lower retail prices. At this time I think we will all agree that retail prices are high compared with wholesale prices, the prices of manufacturers and prices of raw materials. By imposing our ad valorem duties upon the American wholesale value we educate the American people as to wholesale values. If the people know the wholesale value they will have some conception of what the retail price ought to be. This will have a tendency to adjust retail prices to the benefit of the American consumer.

Countries Treated Alike and Inquisition Abroad Made Unnecessary

"3. This plan will make it possible to treat all foreign countries alike by imposing the same duty upon

the same article regardless of the country from which it comes. As it is now we discriminate against those countries having the higher production costs in favor of those countries having the lower production costs, so that to-day we discourage the establishment or maintenance of better living conditions abroad.

"4. American valuation will prevent, to a very great extent, undervaluation and make it possible for the Government to collect substantially all the duty prescribed by law. [The statement here quotes from a British authority as to the great prevalence of undervaluation. Some firms have junior partners who are kept ignorant of values, so that they can testify on invoices to the best of their knowledge and belief. The consular check on invoices is merely nominal.]

"5. Lastly, the American valuation plan would make it unnecessary for this Government to carry on foreign inquisitions in an attempt to secure foreign values, inquiring abroad into the private affairs of citizens of foreign countries, much to their disgust and displeasure. Foreign countries resent these inquisitions and they have resulted in the past in no small amount of irritation upon the part of countries otherwise friendly toward us.

Objections Answered

"The foregoing are some of the advantages of the American valuation plan over the foreign valuation plan. We now desire to consider with you some of the objections that have been urged against American valuation.

"1. It has been contended, or at least intimated, by many people in the press and elsewhere that the American valuation plan necessarily results in imposing more duty upon imported articles than would be the case if the duty were imposed upon foreign value. Some of the critics of the schedules in the pending bill have stated that the duty has been increased merely on account of the substitution of American value for foreign value. This reasoning is fallacious and misleading so far as the unsophisticated are concerned. These critics should address themselves to the rates and not to the base upon which these rates are applied and be made to understand that the same duty could be imposed upon the foreign value provided that could be ascertained with any degree of certainty under present conditions. And in order that the public may not be misled, it should be clearly stated that American valuation in itself does not mean more duty or less duty than we had before.

"2. It has been suggested that the American value would be difficult to determine. It is our view that this value would not be so difficult to determine as the true foreign value if we actually got the true foreign value in all cases. If it costs more to administer our tariff law under the American valuation plan than it does under the present makeshift plan which does not secure the true foreign value, it is our opinion that the proposed substitute will be worth much more to this country than it can possibly cost to administer it.

"One Government expert, if we understand his testimony correctly, after emphasizing the difficulties in putting this plan in force, suggested as a substitute for it, a fictitious foreign value. This fictitious foreign value was to be determined by making certain deductions, some arbitrary and some not, from this identical American value. This suggestion would seem to be an admission upon the part of this Government expert that the American value could be obtained at least for the purpose of determining his suggested fictitious foreign value. If it could be obtained for that purpose, it certainly could be obtained for the purposes of the pending bill. Therefore, we do not look upon this witness as one who believes it impracticable to attempt to ascertain the American value. It is our view that if this bill be enacted into law our Government officials without great difficulty will be able to adjust themselves to the changed conditions and will soon become much more familiar with American values than they have ever been with true foreign values.

"3. It has been urged that if the ad valorem rates be applied upon the American value, the importer will be unable to determine with certainty in advance of payment of the duty the amount thereof. Is it not a fact that any experienced business man, be he a manufacturer or a wholesaler, knows at least two things to almost a certainty; namely: (a) the cost of his product, and (b) the selling price? He would not remain in business long if he did not know these things. If we impose this duty upon foreign value to-day there is bound to be grave uncertainty as to the amount of protection afforded American industry. So if we admit that there might be some uncertainty as to the exact amount of duty collectible in isolated cases, we submit that that uncertainty is negligible, as compared with the uncertainty that would result if these duties are not imposed upon a permanent and substantial base.

"4. Lastly, it has been urged that the American valuation plan would result in permitting the American producer to increase the duty against his foreign competitor by increasing the wholesale selling price here. This proposition has been stated another way by saying that this plan would permit the American producer instead of Congress to write the tariff rates. This we think a novel objection. No one ever suggested to our knowledge as an objection that under our present law the foreigner might reduce the duty against his American competitor by reducing the price upon which the duty was assessed, and therefore the foreigner instead of Congress actually write the rates in the tariff bill. And yet, the foreigner is in a much better position to write the rates (if that is what it amounts to) under the present law, than the American producer would ever be under the American valuation plan. If the foreigner can in any way, under our present law, justify a lower valuation, or if he can get the duty imposed upon a lower valuation without justification, the result is directly beneficial to the foreign importer, because it reduces his duty and increases his profit. If the American producer, on the other hand, attempts to raise the duty by increasing the selling price, thereby writing the rates of duty in the law (if that is what it amounts to) under the American valuation plan, the result is directly disadvantageous to the American producer, because the rate of duty being always less than 100 per cent, he, by his own act, puts himself in a position to be at once undersold by his foreign competitor.

"We have endeavored to weigh before you the advantages and disadvantages of the American valuation plan. We believe that there must be disadvantages, because there always are, but it is our sincere belief that the advantages far outweigh the disadvantages. If we are to have adequate protection for our industries and are to be put in a position in this country to maintain the usual standards of living for our American workers, without the imposition of prohibitive duties against some countries other than Germany, it seems to us, as it does to the honorable Secretary of Commerce, that the American valuation plan is the only alternative."

To Survey Asiatic Markets

WASHINGTON, Aug. 16.—A field survey of Asiatic markets for American goods is to be made by Frank R. Eldridge, Jr., chief of the Far East Division of the Bureau of Foreign and Domestic Commerce. Assignment of a chief of division to such a field survey in the geographical area of the world in the economics of which he specializes is a new departure in federal promotion of American foreign trade.

Sailing from San Francisco about Sept. 22, Mr. Eldridge will accompany the representation from the San Francisco Chamber of Commerce that is planning a tour of Eastern markets for the advancement of trans-Pacific commerce. This trade delegation, with Mr. Eldridge, will visit Yokohama and Kobe in Japan, Shanghai and Hongkong in China, Manila in the Philippines, and Batavia in the Netherlands East Indies. Mr. Eldridge will part company with the San Francisco delegation in Batavia. From the Netherlands East Indies he will proceed to India, where a new field office of the Bureau of Foreign and Domestic Commerce is to be established.

Much of Mr. Eldridge's time in the Far East is to be applied to inspection of the work of men in the field for the Department of Commerce with a view to improving their services to American business.

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THE IRON AGE

EDITORS:

A. I. FINDLEY WILLIAM W. MACON GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

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Competition and the Open Shop

If there had been an agreement among the steel makers not to furnish steel with more than 0.15 per cent carbon, or among the blast furnaces not to supply pig iron except with a silicon content between 1.75 and 2.25 per cent, or had there been other agreements reducing all steel and pig iron to common levels, the agreements would now break down, for we are in a period of strenuous competition. The blast furnace and the steel mill would seek to furnish the material best suited to the buyer's requirements, would strive to give the customer the best service possible. If there had been an agreement not to sell given classes of material at less than certain prices that agreement also would fail.

The competitive conditions among the sellers of material should and will exist also among the sellers of personal service. The average man, working for a wage, will seek to give his employer the best service possible, to do all the work of which he is capable, and the best work, in the time for which the terms of employment pay him. Nominally he will be working for so much an hour or so much a week, but practically he will endeavor to furnish the best service possible in the time. The open shop furnishes the opportunity. The union shop does not.

If there is insufficient employment for all, the better workmen in a union have employment, but the best are not permitted to do their best and if they were they could not expect to be paid proportionately, hence they may well prefer to work under open conditions. The poorer union workmen get no employment at all, and naturally prefer to sell their services for what they are worth under open conditions.

In 1920 the expression became common, "The higher the price, the poorer the quality." It was not the price that made the quality poor. The condition that caused prices to advance permitted quality to deteriorate. In the new condition, the same influence that reduces the price improves the quality. It must be so with labor or personal service. One cannot conceive of an economic condition that would produce price and quality competition in the sale of goods and not corresponding competition in the sale of personal service.

Can the lines of effort in which unionism has been conspicuous withstand this economic pressure? The lines are three—rail transportation, coal mining and the building trades. Already they are under great pressure, from quite different angles. The men connected with these lines comprise less than 10 per cent of the total number of workers, and the smallness of the proportion makes the cases all the more conspicuous.

As to railroad labor, the Transportation Act lays down seven considerations which shall guide the Railroad Labor Board. Not merely one of these seven, but the first of the seven, is: "The scales of wages paid for similar kinds of work in other industries." As to coal mining, scarcely a commodity is in more general use than coal; and seeing that coal is bought by very different kinds of buyers—by the householder, by the public service corporation and by the large private corporation—each class is able to exert a different kind of pressure if coal is not available at a price commensurate with the cost of other things that are bought. A condition of high prices for coal and low prices for everything else could not be expected to last long.

As to the building trades, if the workers cause building costs to be high and thus bring about a great accumulation of deferred building projects, that will not help them as they vainly imagine. Rather it will cause men to seek and find the way out. Experiences of that sort have been common. Time and again a new device has been put on the market and has sold well. One inquires why the thing was not invented a quarter century ago and the answer is it would not have sold well then. When the demand arises the thing is provided, and if an actual demand of sufficient proportions accumulates for dwelling houses or other forms of construction the way will be found to do the work efficiently and cheaply, without the consent of the bricklayers', carpenters' and other unions, if they have survived to that time.

One of the surprises of the post-war export trade of Great Britain and the United States has been the small demand for galvanized sheets. This is in striking contrast with the course of other products. In 1913 Great Britain's exports

of galvanized sheets were 63,500 tons per month and those of the United States 9500 tons per month. In 1919 and 1920 British exports were 15,500 tons and 34,200 tons per month respectively, or much less than the pre-war rate. In the same two years exports from American mills were 8500 tons and 9000 tons per month respectively, or nearly on a par with the pre-war rate. Thus, while the world demand in 1913 as represented by the exports of the two countries was 73,000 tons per month, it has been only 33,600 tons per month in the last two years, a decrease of about 54 per cent. This marked falling off accounts in part for the existing depression in the zinc markets of the world. There is the other side, however, in the backed-up demand that must have accumulated and that will come out later, for galvanized sheets are almost as staple a commodity as tin plate or steel rails.

Future Demand for Metals

That human demands for metals are bound to increase, as present backward countries advance further and further toward the standards of civilization existing in the United States, was pointed out forcibly by H. Foster Bain in a commencement address before the School of Mines and Metallurgy of the University of Missouri, from which institution the address comes as a publication. Mr. Bain pointed out that the pre-war consumption of copper in the United States was from 6 to 7 pounds per capita; in a country as well developed as France, it was only ¼ pound.

China uses about 100 pounds of coal per capita per annum. "Americans use approximately 6 tons, and other peoples use various amounts between. Generally speaking, the world is learning to use more and more coal, and to substitute the mechanical energy of heat for human labor. The United States is by no means the only country where modern plumbing is appreciated, and as the cult of the bathtub spreads around the world, the consumption of metals will grow. This demand can be supplied only by re-use of old metal or by making addition to the world's stock. Mineral wealth, fortunately, is not necessarily consumed in use. There is wastage, but there is also salvage, and large amounts of old metal are continually returning to use, so much so that important metallurgical processes, such as making open-hearth steel and cement copper are based upon supplies of scrap metal."

It would be idle to attempt to forecast the demands of any now backward country at any time when, in the future, its requirements may approach those now prevalent here. Yet it is impressive to note that a consumption of 6 tons of coal per capita for China's 400,000,000 people would represent nearly double the world's total production in 1920, which is estimated at about 1,360,000,000 tons, of which the United States produced 586,000,000 tons, all of Europe 597,000,000 tons, and the rest of the world 117,000,000 tons. Six pounds of copper per head in China would call for approximately the entire world's 1920 production of copper.

If India were to use, for each inhabitant, the equivalent of the 780 pounds of pig iron per capita produced in the United States last year, India's demand for one year alone would absorb all of the 1920 world's production of pig iron, plus the greater part of the 1921 output. The coming of such a time would cause a drain upon the world's iron ore reserves as now known, that would mean impending famine, despite the ever-increasing re-use of old material as scrap.

Beehive and By-Product Coke

The Geological Survey this week reports the output of coke by the by-product process in July. Shortly after the armistice the weekly reports of by-product coke output were discontinued, although beehive production has been reported to date. Beginning with last June a system of monthly reports was instituted for by-product coke. Production is reported for the two months, in net tons, as follows:

	By-Product	Beehive	Total
June	1,410,000	232,000	1,642,000
July	1,285,000	181,000	1,466,000

The most striking feature of the showing is the large proportion of by-product coke—85.9 per cent in June and 87.6 per cent in July. This is a remarkable proportion, for the two branches of the industry are not far from being balanced in potential capacity. With an average operating rate of 85 per cent, which seems to be the acceptable estimate against nominal rated capacity, the by-product ovens have a capacity of about 36,000,000 net tons a year. Whatever may be the capacity of beehive ovens now in existence, it is a fact that in 1916, the record year for beehive coke, 35,464,224 tons was produced by the process. Instead of there being an equal division in July, however, the proportion was about seven-eighths by-product and one-eighth beehive.

Were it not already well known that the production of pig iron recently dropped to a very low level the smallness of coke production, whatever the process used, would be surprising. The July output, shown above, was at the rate of 17,500,000 tons a year, this contrasting with 56,478,185 tons made in 1916, the record year, and about 51,888,000 tons made last year. The rate of production last month was 31 per cent of the average rate in 1916. The rate of pig iron production with coke as fuel, as shown by THE IRON AGE report, was 26 per cent as large last month as in 1916. The comparison suggests that the miscellaneous consumption of coke has held up better than its consumption in the iron blast furnace, though it is a fact that some by-product coke has piled up.

In 1918, the year of maximum production of bituminous coal and of coke, 14.7 per cent of the bituminous coal produced was coked, while the Geological Survey puts the normal proportion at 15 per cent. In July the proportion of bituminous coal produced that was coked was about 6.9 per cent. The comparison suggests what can be seen by other statistical comparisons, that the iron industry has been more depressed than industry in general.

It was to be expected that in a period of gen-

eral depression the by-product coking process should suffer less inactivity than the beehive process, and the experience of last month, with seven tons of by-product coke made to one ton of beehive, fully confirms the expectation. A part of the by-product production, but only a small part, was forced by the existence of contracts for supplying municipalities with gas from by-product operations. The Steel Corporation, without such obligations, discontinued the manufacture of coke in the Connellsville region some three months ago, while it has shipped large quantities of Connellsville coal to its by-product plants. The market in the Connellsville region has exhibited of late the curious spectacle of the price of by-product coal being higher than the amount that could be realized by putting the coal into beehive coke without charging any fixed expense to the ovens.

While the by-product process seems to make a good showing at the moment, from the long range viewpoint very little has been done. It would be only one step in the efficient use of coal simply to make all the metallurgical coke needed. Eventually the major part of the coal produced should be coked, the coke being used as ordinary fuel.

Refining with the Cupola

The cupola has been generally regarded in the iron industry as simply the cheapest and most efficient melting medium for pig iron or scrap. Recent experience, however, points to its possible use as a refining agent of considerable importance.

Besides the experience referred to in THE IRON AGE of July 14, in the lowering of sulphur by an increased lime charge in the cupola, there has been more recently the use of cupolas by a large steel company for furnishing hot metal to basic open-hearth furnaces, as detailed elsewhere in this issue. In this case the cupolas played the role of the modern mixer or took the place of the blast furnace as a source of liquid metal. The point of chief interest is that it was demonstrated to be possible to take heterogeneous pig iron, some quite high in silicon, and measurably eliminate the silicon, making the iron suitable for basic practice. This was accomplished by the proper use of lime in the charges. There was also a decided increase in the steel output of the furnaces and a saving in the limestone necessary in the open-hearth practice.

The author, in summarizing the advantages, claims that the increased yield of steel more than balanced any cupola losses; that the steel production, due to quicker heats, was greater than when using blast-furnace metal, because hot metal was always available from the cupola. While admitting that the advisability of using cupolas for such purposes depends largely on local conditions, he believes, that "with a modern mechanically charged cupola the increased production of the open-hearth furnace from the use of hot metal will considerably more than pay for the cost of operating such a cupola plant."

This testimony places the cupola in a new light. There are doubtless many plants having no blast furnaces or mixers, but in the habit of making quantities of steel, where pre-melting in cupolas would be of value and where advantage could be taken of the refining possibilities. As the quality of pig iron deteriorates or the contamination of scrap increases, the cupola may be found to have advantages which until now have not been thoroughly appreciated. There is at least the assurance that in its usual role in the iron foundry the cupola may be made to refine as well as melt.

The Induction Furnace

Induction electric steel furnaces have played a small role in the remarkable expansion of the American electric steel industry. Only one furnace of this type may be said to have operated successfully for any considerable time, and this is the furnace developed by the General Electric Co. and described in THE IRON AGE last week. There were over 350 arc furnaces in American plants at the opening of this year. It appears that in the General Electric furnace two radical changes have been adopted which overcome the obstacles to previous attempts with this type in the United States. The placing of the entire primary coil on top is one departure and a vital one, because any breaking through of hot metal cannot harm an expensive part of the equipment. The development of a special refractory is another step in advance. Much depends on the lasting qualities of the lining of induction furnaces and it was the fact that Austrian magnesite could not be obtained during the war which in large measure prevented the use of the two or three induction furnaces in American steel works.

Germany has been and still is the country in which induction furnaces have a prominent place in steel making. This is explained partly by the fact that in the early days an arc furnace was as expensive to install as an induction furnace. It is probable, however, that in the United States the induction type can never compete seriously for general purposes, in view of its first cost, but its field will be in the making of unusual and special high grade steels or possibly in special duplexing operations.

Wheeling Steel Corporation Labor Controversy

PITTSBURGH, Aug. 16.—The executive committee of the Amalgamated Association of Iron, Steel and Tin Workers has declared a strike in all the plants of the Wheeling Steel Corporation. Officials of the labor organization say that this is merely a formal step based upon the rules of the association and was forced, it is claimed, by the fact that the company locked the union men out some weeks ago, following the expiration of the agreement on June 30 between the Amalgamated association and the Whitaker-Glessner Co. and the Wheeling Steel & Iron Works.

The Wheeling Steel Corporation officials, it seems, declared some time ago for the open-shop principle and at the Atlantic City and Columbus, Ohio, conferences between the sheet manufacturers and the Amalgamated association, to fix the wage scale for the year ending June 30, 1922, the Wheeling Steel Corporation's subsidiaries were not represented. It has been said that the Amalgamated association made the demand that the Wheeling Steel Corporation sign the scale as a unit, thus covering all subsidiaries, among which is the Labelle Iron Works, which has been operated as an open shop. The Amalgamated officials deny this, claiming that they merely asked for a renewal of the agreement covering the plants of the Wheeling Steel & Iron Co. and the Whitaker-Glessner Co., which previously had been operated as union mills.

CORRESPONDENCE

Proposal to License Business Men

To the Editor.—The suggestion put forward in your issue of July 14 by Mr. Alvan T. Simonds, president of the Simonds Mfg. Co., which urges that no man shall be allowed to engage in business, at least in business involving a capital larger than a certain fixed amount, without passing an examination and securing a license (as the doctor and the lawyer are now required to do), and that no one should be allowed to participate in making laws unless he has proved in some way his fitness to grasp conditions to meet which the laws are being made—the suggestion strikes me as impractical. What we need is not more regulation but less interference with business on the part of the State.

Let us analyze for a moment the very thing that Mr. Simonds puts forward. "The State," he writes, "does not allow men to practise law or medicine without a license, but it allows any man who can secure the proper amount of capital or credit to enter upon a business venture involving not only himself and his future but also the future welfare of thousands of others. When a company employing 30,000 men and women fails because of poor management, due to an ignorance of fundamental economic laws, something has happened that society should not allow."

Doctors and lawyers and certain of the highly trained professions require, for their proper training, a certain amount of knowledge which can be obtained only from the study of books, and then rarely in any other way than by attendance at a proper institution of learning. In the case of doctors, and in a less degree in the case of lawyers, the life of the individual is at stake, and the State, very properly, requires that there shall be at least a minimum of knowledge.

In the case of a business man, however, does anyone suppose that any Tom, Dick or Harry can secure "the proper amount of capital or credit to enter upon a business venture" of any size without having his experience, character and references carefully investigated? Furthermore, the companies employing 30,000 men are few and far between, and such companies, and even much smaller companies, are almost universally managed by boards of directors who have definite obligations imposed upon them by law. The executives of such companies, moreover, are selected by the directors because of their supposed fitness for the task. In other words, while we have to-day no guarantee of fitness granted by any State licensing board, there is a constant weighing and examining going on by judges who are far more competent than any that the State could hire, namely the banks and credit departments from whom accommodation is asked, the various directors of the company, and, further, the stockholders themselves, beyond whom, in the case of the larger corporations, is the court of public opinion. All of these things act as checks on mismanagement. It is freely granted that notwithstanding all of these checks, cases of mismanagement are frequently and constantly arising, but to think that these cases can be cured by any State licensing device is absurd. Let us take a few concrete cases:

Some years ago the Westinghouse Electric & Mfg. Co. failed. Could this failure have been averted by asking Mr. George Westinghouse to pass an examination and take out a license from some State board? Or is it conceivable that Mr. Westinghouse could not have passed such an examination?

Within the memory of all of us, the New York, New Haven & Hartford Railroad was considered one of the prime investments, and we all remember the various disasters which overtook it, and which certainly were due to bad judgment and bad management. Is it conceivable that this situation could have been averted by asking the various gentlemen connected with the New Haven Railroad to pass an examination as to their fitness as business men?

Let us take the reverse of this picture. Mr. Henry Ford's replies on the witness stand to questionings in his famous libel suit a few years ago would not indicate his ability to pass an examination of the type that would be conducted by any State examining board authorized to issue licenses to business men. Yet it will be conceded that Mr. Ford has managed to build up a fairly tidy business.

Let us now pass to Mr. Simonds' next point in regard to licensing lawmakers. He states, "Is it not a rather curious attitude on the part of the public to require all those who are to practise law to go through a long term of study and to pass difficult examinations before they are admitted to the bar, and at the same time to send to our legislature and to Congress, to make laws, men who have little or no knowledge of the great fundamental principles that underlie the prosperity of the country?"

Unfortunately for Mr. Simonds' argument, the very men who he states have to go through this long term of study and pass difficult examinations before they are admitted to the bar are the very ones whom we send to our legislatures and to Congress. The percentage of lawyers in Congress and in the various State legislatures is overwhelming.

We all agree with Mr. Simonds that the more education we can have in business, and the more education we can have in our halls of legislature, the better it will be, but there is no panacea in any licensing device and no royal road to success possible by legislation. Certainly no additional paternalism on the part of the State will bring us to Utopia.

JOHN C. JAY, JR.

New York.

Compression Strength of Metals and Alloys

With a view to arriving at a satisfactory measure of the compressive strength of certain metals and alloys, A. Pomp, in an article in *Zeitschrift des Vereines Deutscher Ingenieure*, Sept. 11, 1920, has recently tested a number of specimens 10 mm. diameter and 20 mm. height in a 15-ton Amsler machine, and has given the results in diagram and tabular form from which the following table, showing the correspondence between the relative tensile strength and the relative pressure required to produce a compression of 10 mm., is extracted by *Technical Review*, London:

Material	Tensile Strength, Kg., Per Sq. Mm.	Compression Pressure, Kg.	Relative Strength, Per Cent	Relative Pressure, Per Cent
Steel (0.5% C), annealed	54.0	13,050	100.0	100.0
Brass (62% Cu), annealed	46.0	11,480	85.0	88.0
Mild steel (0.06% C), annealed	38.5	9,800	71.5	75.0
Copper, annealed	22.0	5,200	40.8	40.0
Aluminum, annealed	10.0	2,910	18.6	22.3
Lead-tin alloy (3%), pressed	2.4	630	4.5	4.8
Lead, pressed	2.2	405	4.1	3.1

The Iron Age and Its Readers

It has been one of the aims of THE IRON AGE to keep its readers posted on each new development in the notable expansion of the electric steel industry since its beginnings in this country a few years before the war. Besides data of a statistical nature, there has been presented complete information concerning the new types of furnaces as they have appeared from time to time. It is believed that THE IRON AGE has featured, by full descriptions and illustrations, every furnace that has secured its place by active commercial operation in the industry, and only such furnaces. The latest appeared in last week's issue when the new induction furnace of the General Electric Co. was described. The claim made is also true of the non-ferrous industry, which is fast showing a great dependence on the electric furnace for melting.

Iron and Steel Markets

PIG IRON ADVANCES

Buying on Larger Scale Than in Months

In Finished Steel Evidence Increases That Stocks Are Being Exhausted

The recent low dip in pig iron prices led to buying on a scale probably not equaled in a year, and producers of foundry iron in all districts shared in the business. A good many consumers whose stocks had run down sensed the possibilities of the low rate to which output had fallen and decided to buy.

In the past week furnaces at Chicago, St. Louis, Buffalo, and in Ohio and Pennsylvania districts have advanced their prices by 50 cents to $2 per ton in an effort to limit the losses they have been making on raw materials bought last year. While the extent of the actual rebound in the market is uncertain, the firmer stand of producers is marked and its effect will be closely watched.

The situation in finished steel differs from that in pig iron. Steel works are being run and none are dropping out of the race. Buyers do not believe that low point has been touched and are working close on stocks. The Ford Motor Co., in keeping as far as one month ahead of the mills, is an exception.

The past week has shown continued irregularities in prices, on some products rather more resistance to declines, but generally a willingness of producers to meet competition. The expectation of some increase in operations in the fall is general and is based on evidence that many consumers have used up their stocks and must buy on a larger scale. Producers report a moderate increase in buying in the past week, but the testimony is not pronounced or uniform.

In the effort to get business various mills are crossing usual lines. Makers of strip steel have sought orders in hoops and bands by low offers. Plate mills have gone in the field of the strip steel mills and rollers of light plates have made attractive offers on blue annealed sheets.

Some new-comers into the automobile sheet field have made concessions of several dollars a ton to get trial orders.

Wire products are as firmly held as any finished line—more firmly than the leading heavy products. New business is coming to some important producers at up to about 30 per cent of capacity, with indications that stocks are small all along the line.

New car work and car repairs are bringing further orders to the mills, but not to the extent producers have been led to expect. The railroad repair shops have plenty of steel in stock and are using it. Cars for the Kansas, Oklahoma & Gulf will require 5000 tons of plates, shapes and bars. A Chicago district car repair shop is in the market for 2500 tons of plates. About 10,000 tons of steel will be needed for the repair of 4950 cars and inquiries for 450 new cars have appeared.

Chicago still leads in concessions on plates which are the partial absorption of Pittsburgh freight. While business there has gone at 1.65c. and less, mills farther East have stopped at 1.75c., and 1.80c. has been secured on considerable business.

While the cotton tie season opened some weeks ago on the basis of $1.35 per bundle, the price has now settled to $1.30, Pittsburgh, in part in view of the decline in other mill products and in part because of German competition.

New structural work in excess of 30,000 tons has come on the market, including 18,350 tons for two Federal Reserve banks. Awards probably totaled about 4000 tons.

Some fair orders have been taken for tin plate recently, chiefly from oil companies, one large interest in this line buying over 3000 tons.

The slow progress in the plans for railroad relief at Washington is a matter of concern in the steel trade.

Basic pig iron figured in the increased activity in the eastern Pennsylvania market, one steel company taking 2000 tons and another 5000 tons, the prices ranging from $19 to $19.50 delivered. In the Central West the steel companies which for some time have made the market by sales of basic pig iron have advanced to $20 at furnace, or $1.50 to $2 above recent prices. In foundry iron radiator companies have figured in late buying, but specific reports of heavy tonnages taken by one such interest have not been confirmed, apart from a Buffalo transaction.

Scrap iron and heavy melting steel have shared in the strengthening of primary materials that has marked the past week, the advance in some forms of old material being not far from $1 per ton.

The action of Eastern railroads in agreeing to a 25 per cent differential on steel shipments for export recognizes the low state of that trade.

Pittsburgh

PITTSBURGH, Aug. 16.

The outstanding development of the past week in the situation here is a stronger market in the basic materials. An advance, amounting in some cases to $2 per ton, has been announced in basic pig iron by several of the steel companies, which hitherto have been supplying the demand, while the virtual exhaustion of furnace yard stocks of the foundry grade, coupled with the disinclination of makers of the latter to start up idle furnaces on to-day's costs and selling prices, has encouraged the asking of higher prices than have prevailed recently. In scrap iron and steel further advances amounting in a number of instances to $1 a ton have been established in the past week. This effort toward strengthening the foundation of the market structure naturally is looked upon as a constructive move. It may be said, however, that in the case of basic pig iron the attempt to obtain higher prices is based less upon a better demand or lack of supplies than a desire on the part of the steel company to reduce the losses which the recent base of $18 at furnace entailed.

The quite general report about the steel business is that orders are considerably more numerous in almost all lines than they were recently, but no claim is made that the individual orders are any larger than they have been in the past few weeks, nor do they reflect any abandonment on the part of buyers of a policy to take on supplies only as they are needed. Since practically everything bought is for immediate

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Aug. 16, 1921	Aug. 9, 1921	July 19, 1921	Aug. 17, 1920
No. 2X, Philadelphia‡	**$20.34**	$19.84	$21.85	$52.90
No. 2, Valley furnace†	19.50	19.50	19.50	50.00
No. 2 Southern, Cin'ti†	23.50	23.50	24.50	45.60
No. 2, Birmingham, Ala.†	19.00	19.00	20.00	42.00
No. 2, foundry, Chicago*	**20.00**	18.25	18.50	46.00
Basic, del'd, eastern Pa	20.26	20.26	21.25	48.30
Basic, Valley furnace	18.00	18.00	19.00	48.50
Bessemer, Pittsburgh	21.96	21.96	22.46	48.40
Malleable, Chicago*	**20.00**	18.50	18.50	46.50
Malleable, Valley	20.00	20.00	20.50	50.00
Gray forge, Pittsburgh	21.46	21.46	21.46	50.40
L. S. charcoal, Chicago	33.50	33.50	36.00	57.50
Ferromanganese, del'd	70.00	70.00	70.00	200.00
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	$45.00	$45.00	$45.00	$55.00
O.-h. rails, heavy, at mill	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh	30.00	30.00	33.00	60.00
O.-h. billets, Pittsburgh	30.00	30.00	33.00	60.00
O.-h. sheet bars, P'gh	32.00	32.00	35.00	68.00
Forging billets, base, P'gh.	35.00	35.00	38.00	80.00
O.-h. billets, Phila.	35.74	35.74	38.74	69.10
Wire rods, Pittsburgh	42.00	42.00	42.00	75.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	1.75	1.75	2.00	3.25
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.05	2.05	2.10	4.75
Iron bars, Chicago	1.75	1.75	1.90	3.75
Steel bars, Pittsburgh	1.75	1.75	1.80	3.25
Steel bars, New York	2.13	2.13	2.18	4.02
Tank plates, Pittsburgh	1.80	1.80	1.80	3.25
Tank plates, New York	2.18	2.18	2.18	3.52
Beams, etc., Pittsburgh	1.85	1.85	1.85	3.10
Beams, etc., New York	2.23	2.23	2.23	3.27
Steel hoops, Pittsburgh	2.25	2.25	2.50	5.50

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Aug. 16, 1921 Cents	Aug. 9, 1921 Cents	July 19, 1921 Cents	Aug. 17, 1920 Cents
Sheets, black, No. 28, P'gh.	3.00	3.00	3.25	7.50
Sheets, galv., No. 28, P'gh.	4.00	4.00	4.25	9.00
Sheets, blue an'l'd, 9 & 10.	2.25	2.40	2.50	6.00
Wire nails, Pittsburgh	2.75	2.75	2.75	4.25
Plain wire, P'gh.	2.50	2.50	2.50	3.75
Barbed wire, galv., P'gh.	3.40	3.40	3.40	4.45
Tin plate, 100-lb. box, P'gh.	$5.25	$5.25	$5.75	$9.00
Old Material, Per Gross Ton:				
Carwheels, Chicago	**$13.00**	$12.50	$12.50	$38.00
Carwheels, Philadelphia	16.00	16.00	16.00	40.50
Heavy steel scrap, P'gh.	**13.00**	12.50	12.00	29.00
Heavy steel scrap, Phila.	11.50	11.50	11.00	26.00
Heavy steel scrap, Ch'go.	**10.75**	10.25	10.00	25.00
No. 1 cast, Pittsburgh	16.00	16.00	16.00	41.00
No. 1 cast, Philadelphia	17.00	17.00	17.00	39.00
No. 1 cast, Ch'go (net ton)	**13.00**	11.50	12.50	36.00
No. 1 RR. wrot, Phila.	14.00	14.00	13.50	33.00
No. 1 RR. wrot, Ch'go (net)	**11.00**	9.75	9.00	24.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$2.75	$2.75	$17.50
Foundry coke, prompt	3.75	3.75	4.00	18.50
Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	12.00	12.00	12.75	19.00
Electrolytic copper, N. Y.	11.75	11.75	12.62½	19.00
Zinc, St. Louis	4.20	4.20	4.25	8.00
Zinc, New York	4.70	4.70	4.75	8.35
Lead, St. Louis	**4.25**	4.20	4.35	8.87½
Lead, New York	4.40	4.40	4.40	9.12½
Tin, New York	*26.12½*	27.75	27.00	48.00
Antimony (Asiatic), N. Y.	*4.50*	4.60	4.65	7.00

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, Aug. 16, 1921, Finished Steel, 2.364c. per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel.

Aug. 9, 1921,	2.364c.
July 19, 1921,	2.407c.
Aug. 17, 1920,	3.974c.
10-year pre-war average,	1.684c.

delivery, not a little of the demand is being met from the mill stocks and the effect upon steel works and rolling mills operations is not pronounced. Building up of a backlog is almost out of the question so long as buyers generally are purchasing so close to their needs.

The Ford Motor Co. is scheduling about one month ahead and making a strong effort to keep its raw material inventory down to about three weeks' requirements. But this company is the only important consumer of steel that is buying even that far ahead. The natural inference from this policy is that buyers do not yet believe that the lowest prices have been touched.

Considerable irregularity still exists in prices, although in general there is slightly more resistance to efforts to force further declines than there was a few weeks ago. There are still a few manufacturers who want business so badly that they are naming very attractive prices, and since the greatest concessions are offered to the regular customers of other companies rather than their own, it is necessary for the other companies to either meet competitive prices or suffer the loss of regular patrons. The tendency to "poach in the other fellow's preserves" is one of the evils of the present situation. Some of the makers of strip steel are charged with having similarly sought business at very low prices in hoops and bands, and makers of plates similarly are credited with having tried, by naming low prices, to take business away from strip steel mills, while very low prices have been done on blue annealed sheets because of competition between plate makers and sheet manufacturers. Most plate mills can roll sheets up to No. 12 gage and when based upon the plate card can name a lower price than the regular makers.

Pig Iron.—Practically all of the steel companies which hitherto have been supplying the demand for, and making the open market in, basic pig iron, have in the past week gone to a minimum of $20, furnace, for this grade. This price represents an advance of at least $1.50 a ton, and in a few instances $2 a ton from what these interests previously were willing to accept. Merchant producers having any stocks of this grade, also, now are asking $20, furnace, minimum, but since this price has not yet found a basis in sales, it must be regarded merely as a quotation. The most recent transaction in basic iron was one of 2000 tons taken by a Pittsburgh district sheet maker, who claims to have secured the tonnage at a delivered price of about $20. This would be equivalent to about $18.04, if the iron came from Valley furnaces, and slightly more from furnaces having a lower freight rate into the Pittsburgh district. The same interest bought 500 tons of Bessemer iron at about 50c. per ton below the Valley furnace price on this grade. This iron was bought at $21.44, delivered, as against $21.96, the delivered price on Bessemer from Valley furnace. Foundry iron is quite firmly held, not because of the size of the demand but rather because so little of this grade now is available. On No. 2 plain, $20 is the minimum asking price and one producer is unwilling to go below $20.50, while still another, with furnaces in western Pennsylvan a and Cleveland, has announced a price of $20, Cleveland, which would mean $22.94 delivered into this district. The Iron City Sanitary Mfg. Co. recently closed for 500 tons of No. 2 plain and No. 2X at an average price of $20, western Pennsylvania furnace. The recent pur-

chases of the Standard Sanitary Mfg. Co. for its Louisville, Ky., plant were made at $18.25, Birmingham, for No. 2 plain, and at an even lower base price for some high silicon iron purchased in that district. It also bought some iron in Chicago at $18.50, the purchase including No. 2 plain and iron of higher silicon content. The Union Radiator Co., Johnstown, Pa., is in the market for 250 tons of No. 2 plain, while Phillips Mill & Supply Co. is seeking 200 tons of low silicon iron for prompt delivery and the Danville Iron & Steel Corporation, Danville, Pa., wants 200 tons at 2.25 to 2.75 per cent silicon iron for last quarter delivery. Altogether about 1000 tons of foundry iron are wanted.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$18.00 to $20.00
Bessemer	20.00
Gray forge	18.50 to 19.50
No. 2 foundry	19.50 to 20.00
No. 3 foundry	19.00 to 19.50
Malleable	20.00

Ferroalloys.—Inquiries for ferromanganese are somewhat more numerous than they have been, but with the exception of one from a Valley steel maker calling for 200 to 300 tons, for September and October shipments, they rarely exceed a carload. Among the latter is one from a Detroit steel casting company against which a price of $75 delivered on domestic 80 per cent material has been quoted. The most recent business done in domestic ferromanganese was at $70 delivered, for 80 per cent alloy, and with British ferromanganese available at $65 c.i.f., Atlantic seaboard, of $70.32, delivered Pittsburgh, it is doubtful if much more than $70 delivered to-day could be obtained for the domestic product. Very little interest is noted in other ferroalloys. Makers of 50 per cent ferrosilicon are not publicly quoting less than $65 furnace, freight allowed, but there has been no business recently to support this quotation. Spiegeleisen is offered at $26 for average 20 per cent material, but does not find much demand.

We quote 78 to 82 per cent domestic ferromanganese at $70 delivered; 76 to 80 per cent $68; 76 to 80 per cent British ferromanganese, $65, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at $26 furnace; 16 to 19 per cent, $25; 50 per cent ferrosilicon, domestic, $60, furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent $36.50; 11 per cent, $39.80; 12 per cent, $43.10; 13 per cent, $47.10; 14 per cent, $52.10; silvery iron, 6 per cent, $25; 7 per cent, $26; 8 per cent, $27.50; 9 per cent, $29.50; 10 per cent, $31.50; 11 per cent, $34; 12 per cent, $36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Small lot inquiries for sheet bars are fairly numerous, in keeping with the better demand for sheets. The bulk of recent business has been done at $30, f.o.b. maker's mill, and this means f.o.b. Youngstown, in view of the fact that makers in that district have taken a part of the business. It is not possible to quote this price, f.o.b. Pittsburgh, because makers here will not go that low to secure business. Too little is going on in billets and slabs definitely to determine prices. It is said that a really desirable tonnage would develop a price of less than $30 for 4-in. rerolling billets, but, on the other hand, a recent bid of $28 Pittsburgh, against a substantial tonnage was turned down without consideration. Demand for slabs has rarely been as limited as it is at present. The claim is made that with plates selling at 1.80c. base and bars at 1.75c., there is not much profit in billets at $30 or slabs at $31, the present quotations.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $30; 2 x 2-in. billets, $32; Bessemer and open-hearth sheet bars, $30 to $32; slabs, $31; forging billets, ordinary carbons, $35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The price of $42 Pittsburgh for No. 5 common soft rods still is the public quotation of all makers, but there is not enough business to provide a real test of this figure. We note a fair sized sale of some screw stock rods at $47, Pittsburgh, which on the basis of the differentials would support a price of $42 for ordinary soft rods. At the same time, the opinion is pretty common that an inquiry for 2500 to 5000 tons would bring concessions. Rods for export are said to have been offered at $38, Pittsburgh, for soft rods, and around $45 for carbon rods. Prices are given on page 435.

Structural Material.—Fabricating interests here generally report a fairly good inquiry but that they are getting no important awards. Bids were opened yesterday against the 8-story addition to the store of Joseph Horne Co., which will take about 3000 tons of steel, but no information yet is available as to who is the low bidder. Bids will be opened by the County Commissioners next Monday for a new bridge over the Allegheny River at Sixteenth Street, for which 5000 tons of steel will be wanted. There is little real activity in plain material but most makers report orders for small tonnages to be somewhat more numerous than they were recently. The going price on such lots is 1.85c., but the belief still is prevalent that considerably less could be done on sizable tonnages. Prices are given on page 435.

Steel Skelp.—A Pittsburgh district maker of lap-welded boiler tubes recently closed for a fair sized tonnage of skelp at 1.90c., Pittsburgh. Material for this use is of lighter gage than that employed in making standard pipe, and consequently commands a premium over pipe skelp because of the heavier labor charge. Pipe skelp is available at 1.75c.

Iron and Steel Pipe.—As is the case with almost all finished steel products, there is a fairly good run of small orders in standard steel pipe, but all makers note a tendency on the part of distributers merely to order supplies as they are needed, and no especially large individual orders are coming in. Since a good many of the current demands can be met from stock, mill operations do not increase much. There is good observance of the July 7 card on standard pipe, but on line pipe, prices vary considerably with the different makers, just as they have for some time past. Demand for oil well tubular goods remain extremely slow. Makers of wrought iron pipe are getting more business, but as is the case with steel pipe, the orders are more numerous than large. Discounts are given on page 435.

Iron and Steel Bars.—Rumors are common that less than 1.75c. is being done in mild steel bars, but they find no verification, as far as the general run of current orders are concerned, by makers in this district. While buyers seem to have fixed upon 1.50c. as the ultimate price, there are no makers willing to entertain within several dollars a ton of that figure and in support of the assertion that 1.75c. is being done more generally, it is pointed out that the Ford Motor Co., which is one of the largest buyers of the moment, is paying the latter price. Reinforcing bars occasionally sell down to 1.70c., base, although the more common quotation still is 1.75c. Makers of iron bars still are endeavoring to hold to 2.25c., Pittsburgh, for refined iron in carload lots. Chicago advices are that common iron bars recently sold there at 1.62½c.

We quote steel bars rolled from billets at 1.75c.; reinforcing bars, rolled from billets 1.70c. to 1.75c. base; reinforcing bars rolled from old rails, 1.60c. to 1.75c.; refined iron bars, 2.25c. to 2.40c. in carloads, f.o.b. mill, Pittsburgh.

Nuts, Bolts and Rivets.—It is impossible to record even the slightest betterment in business and prices are extremely indefinite as far as Pittsburgh makers are concerned, most of them having shut down rather than pile up stocks at current costs and possibly carry them for a long time. Most makers actually are out of the market for the time being and are not making quotations. Prices and discounts are given on page 435.

Steel Rails.—The market for light rails still is dull and unsettled. Steel companies who are regular producers of these sections are quoting 1.85c. Pittsburgh for 25-lb. to 45-lb. rails. Against this, however, is an offering by one of the smaller makers of rails rolled from guaranteed soft steel at 1.60c., mill, or about 1.75c., Pittsburgh. Mills rerolling old rails also are on a basis of 1.60c., but since the railroads are not pulling up many heavy rails, the rerolling mills only occasionally can offer light sections of more than 30-lb. to the yard. Specifications against orders for standard rails are slightly larger than they have been.

We quote 25 to 45-lb. sections, rolled from new steel, 1.85c.; rolled from old rails, 1.60c. to 1.75c.; standard rails, $45 mill for Bessemer and $47 for open-hearth sections.

Plates.—Orders are more numerous, but they leave much to be desired both individually and in the aggre-

gate. While 1.85c. is the common asking price few buyers are forced to go that high even on small tonnages. We note a sale of a couple of carloads to a tank and stack builder at 1.80c. and there is still a common belief among buyers that they could obtain a lower price if they had sizable tonnages to place.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.80c. to 1.85c. f.o.b. Pittsburgh.

Wire Products.—Orders with all makers in this district are more numerous than they were recently, but they run entirely to small lots for immediate shipment, and since manufacturers can supply them in most instances from stock, they do not mean any material increase in mill operations. Nail orders are comparatively good, but there is a fair sprinkling of plain, galvanized and barbed wire business. Talk of price cutting still persists, but does not find confirmation.

We quote wire nails at $2.75 base per keg, Pittsburgh, and bright basic and Bessemer wire at $2.50 base per 100 lb., Pittsburgh.

Sheets.—Although further expansion is noted in the number of orders and they are coming alike from jobbers and consumers, there continues to be more or less cutting of the regular market bases of 3c., 4c. and 2.40c. respectively, for black, galvanized and blue annealed. Concessions from these prices are slight in black and galvanized sheets but in blue annealed the competition from plate makers is rather sharp and to hold regular customers sheet makers have gone as low as 2.25c. base. Orders in all cases are for quick shipment and to a large extent are made from stock. Mill operations, consequently, are not much heavier than they were recently. Prices are given on page 435.

Tin Plate.—Orders for small lots for prompt shipment are coming along fairly well but there is no gain in business for future shipments. Makers report no difficulty in obtaining $5.25 per base box, Pittsburgh, on standard cokes. Not much export business is developing as Welsh makers are quoting more attractive prices.

Hot Rolled and Cold Rolled Strips.—Regular makers of hot rolled strips regard the market as 2.40c. base, Pittsburgh, and are not disposed to cut this price. However, there are some companies with equipment for rolling hoops and bands and plates which are actively soliciting business in strips and going as low as 2.25c. to secure orders, and occasionally regular makers meet competition to hold regular customers. Competition is not so keen in cold rolled strips, and the market is fairly steady at 4c. base, Pittsburgh.

Cotton Ties.—It develops that shortly after the opening of the season on the basis of $1.35 per bundle of 45 lb., Pittsburgh, the market settled to $1.30, partly in keeping with other merchant mill products, and also because of German competition. The August delivery price, therefore, is $1.31, the carrying charge being 1c. per bundle per month.

Spikes.—The New York Central Railroad recently closed with a Pittsburgh maker for 21,500 kegs of standard spikes, at 2.75c. base. No other important sales recently have been made and such inquiries as are coming out are for small lots, and are not very numerous. Inquiry for small spikes is reported to be somewhat better than it has been. Track bolts recently went to 3.25c. on a sale of 2000 to 3000 kegs, but this is below the price ideas of most makers in this district, some of whom are not willing to go below 3.75c. base on carloads of a size. Prices are given on page 435.

Boiler Tubes.—Business still is of rather limited proportions, although in the past week or so orders have increased in number if not in size. On lap-welded steel tubes prices still favor buyers, and on seamless tubes conditions are very similar. Discounts are given on page 435.

Cold Finished Steel Bars.—A strong effort is being made by makers to maintain a base of 2.60c., Pittsburgh, and on small tonnages this price is the rule. However, there have been concessions of $2 to $4 per ton from this price on desirable business, and it is probable that the lower prices would be repeated on inquiries of an attractive character.

Hoops and Bands.—The general quotation of makers still is 2.40c. base Pittsburgh on both products, but a quotation of 2.25c. recently made to large cooperage interests by some makers failed to bring the orders, the word being that the business was placed for less money. Apparently some mills are taking business based upon the bar card instead of the hoop and band card. On the other hand, the Carnegie Steel Co. claims to be getting business at 2.40c. base.

Coke and Coal.—The American Rolling Mill Co., Middletown, Ohio, is considering blowing in one of its furnaces at Columbus, Ohio, and has put out an inquiry for 10,000 tons of coke for September shipment. The Thomas Iron Co. also is reported to be in the market for a round tonnage. Outside of these inquiries the market presents no new features. One inquiry is regarded here as nothing more than a "feeler" and that quotations made by Connellsville operators will be used as a lever to pry down prices from a more convenient source of supply. It is doubtful if the operators will name a very low price since few would be inclined to light up idle ovens for merely a month's run. The spot furnace market still is quotable at $2.75 to $3, some being able to obtain the latter price, while others find that disposal of surplus tonnages is not possible at much above $2.75. There is a steady business in foundry coke with small lot buyers paying $4.25 to $4.50 and those able to provide fairly large tonnages cover them from $3.75 to $4. The coal market does not change much except that there are rather more inquiries for future shipments, some consumers being inclined to build up reserve stocks. Mine-run steam coal is quotable from $1.50 to $2, by-products within the same range, and gas coal from $2 to $2.50. Slack grade is quotable at $1.75 for steam and $1.85 for gas.

Old Material.—The stronger tendency in pig iron prices due to the reduction in available supplies is finding reflection in a more active and a stronger market for old material. Advances of at least 50c., and in most cases $1 per ton, from last week's levels, are noted as the larger demand has disclosed only limited tonnages of scrap available for early delivery. A number of dealers here are trying to buy heavy melting steel at $13, f.o.b. the plant of a large Pittsburgh independent steel company, but are finding it rather difficult to uncover supplies at that price. Several dealers with yards in this district have rather sizable stocks of open hearth grades, but as it cost well above current levels, the market would have to move up to a basis of at least $17 Pittsburgh for heavy melting steel before any of these stocks would become available. A West Virginia steel maker recently paid $10.50 delivered for compressed sheets, $8 delivered for machine shop turnings, and $8.75 for short shoveling turnings, but it is doubtful if those prices could be repeated today, the average price idea of most dealers being well above these figures. The general market is aided by the fact that current offerings run small, rarely reaching a total as large as 2000 tons.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	$13.00 to $13.50
No. 1 cast cupola size	16.00 to 16.50
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Parkersburg and Huntington, W. Va.; Franklin, Pa., and Pittsburgh	15.50 to 16.00
Compressed sheet steel	10.50 to 11.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist.	9.00 to 9.50
Railroad knuckles and couplers	14.00 to 14.50
Railroad coil and leaf springs	14.00 to 14.50
Railroad grate bars	11.00 to 11.50
Low phosphorus melting stock, bloom and billet ends, heavy plates, ¼-in. and thicker	17.00 to 17.50
Railroad malleable	13.00 to 13.50
Iron car axles	19.00 to 20.00
Locomotive axles, steel	18.50 to 19.00
Steel car axles	14.50 to 15.00
Cast iron axles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Machine shop turnings	8.00 to 8.25
Sheet bar crop ends at origin	12.50 to 13.00
Heavy steel axle turnings	9.50 to 10.00
Short shoveling turnings	8.75 to 9.25
Heavy breakable cast	14.50 to 15.00
Stove plate	12.00 to 12.50
Cast iron borings	8.50 to 9.00
No. 1 railroad wrought	12.00 to 13.00

Chicago

CHICAGO, Aug. 16.

It develops that producers of merchant pig iron booked a substantial tonnage just prior to the advance a week ago, one order from a steel company calling for 10,000 tons of basic and another from a Wisconsin melter amounting to 5000 tons of foundry. There continues to be active inquiry for pig iron and some orders involving several hundred tons have been closed at $20 base, Chicago furnace. Producers are holding firm at the new price and it is intimated that a further advance to $21 may be made.

Demand for finished steel has not shown a change similar to that which has taken place in the pig iron market. Except for railroad car construction and repair work, which is gradually increasing in importance, there is little in sight which will call for any considerable tonnage of plates, structural material or merchant bars. Reinforcing bars are in fair demand, however, but in the absence of purchases of merchant bars by manufacturers, there is by no means enough bar business to go around and competition among mills is keen. Evidently reflecting an increase in dwelling house construction, sheet metal shops are busy and are buying fair tonnages of sheets. There is also better demand for light plates.

The price situation has undergone little material change. Sheets are firmer but the same cannot be said of plates, structural material and bars. Wire products, the demand for which has been maintained, are holding more steadily than any other finished commodity. Structural lettings are still too light to give stability to the market. The successful bid on 971 tons for the Ruggles & Radmaker salt plant, Manistee, Mich., was $70 erected. The American Bridge Co. took the business.

Reduced freight rates on steel and pig iron to the Pacific Coast have been brought one step nearer by the transcontinental freight committee's approval of a proposed cut averaging 33 1/3 per cent. The rate on plates, structural shapes and bars is brought down to $1 per 100 lb. and on pig iron to 90c.

Mill and blast furnace operations in this district are substantially unchanged.

Pig Iron.—As noted a week ago the advance in local iron brought considerable business to a head. Probably the largest individual order taken was 10,000 tons of basic bought by a local steel plant. A Wisconsin maker of sanitary goods closed for 5000 tons of foundry. While buying has not been so brisk during the past week as it was just before the advance, inquiries are numerous and some fair-sized lots have been purchased, including one of 800 tons of foundry iron. Outside of the agricultural implement manufacturers, there are few melters with heavy stocks of iron in their yards or on order. Some of these have already entered the market for their needs and others are expected to do likewise. That foundry operations are slowly improving is evidenced by a sustained betterment in the demand for coke. During the first fifteen days of this month, the local by-product maker shipped over twice the tonnage of coke shipped to melters during the first half of July. The change that has taken place in the pig iron market may be best appreciated by recalling conditions 90 days ago. Then the only purchases of any size were by radiator and boiler manufacturers. Since that time, however, buying has slowly increased, at first being confined largely to carload orders and later developing to the point where orders of from 100 to 1000 tons became more numerous. There are still many foundries that are idle but the progess that has been made up to date is impressive. Local furnaces are holding firmly at the new price of $20 and it is intimated in some quarters that prices may be again advanced to $21, base. With a sale of a carload of low phosphorus at $30, furnace, about two weeks ago, one Ohio producer disposed of the last of its yard stocks and, not being in blast, is now out of the market. Other makers are quoting $36 to $37, furnace. Some resale low phosphorus has been offered at $34, Chicago, but the tonnage is not large.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$33.50
Northern coke, No. 1, sil. 2.25 to 2.75	20.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	20.00
Northern high phos	20.00
Southern foundry, sil. 1.75 to 2.25	25.67
Malleable, not over 2.25 sil.	20.00
Basic	20.00
Low phos., Valley furnace, sil. 1 to 2 per cent, copper free	$36.00 to 37.00
Silvery, sil. 8 per cent	31.82

Ferroalloys.—There has been no further activity in any of the ferroalloys. The Griffin Wheel Co. bought ferromanganese at $68, delivered, instead of $71, as reported last week. Spiegeleisen 18 to 22 per cent is quoted at $26 to $28, furnace, varying freight from different producing points bringing the delivered price to $36 to $37.

We quote 78 to 82 per cent ferromanganese, $68 to $71 delivered; 50 per cent ferrosilicon, $62.50 to $65 delivered; spiegeleisen, 18 to 22 per cent, $36 to $37 delivered.

Rails and Track Supplies.—The Missouri Pacific has bought 2500 tons of tie plates at a price reported not to exceed 2c., mill. The order was divided between a Chicago and a Birmingham Mill. The New York Central has placed 22,000 kegs of track spikes with a Pittsburgh mill at 2.50c., f.o.b., Pittsburgh. Demand for track supplies is light and competition on business offered is sharp.

Standard Bessemer rails, $45; open-hearth rails, $47; light rails rolled from new steel, 1.85c. f.o.b. makers' mills.

Standard railroad spikes, 2.50c. to 2.75c., Pittsburgh; track bolts with square nuts, 3.50c. to 3.75c., Pittsburgh; tie plates, steel and iron, 2c. to 2.25c., f.o.b. makers' mills.

Plates.—Railroad car repair programs continue to bring tonnage into the market. A car repair shop in this vicinity is inquiring for 2500 tons of plates. Orders for new cars to be let by the Kansas, Oklahoma & Gulf, will involve 5000 tons of plates, shapes and bars. The Chicago, Rock Island & Pacific is asking for figures on the construction of 200 hopper bottom coal cars of 50 tons capacity and on the repair of 250 50-ton general service cars. The Burlington is inquiring for material and miscellaneous parts for 100 Gondola cars which will be repaired in the railroad's own shops. Prices on tank plates still lack stability. Between 1.60c. and 1.65c., Pittsburgh, has not been uncommon, but some business has been closed at even lower figures, while other orders have been placed at the full official price of 1.85c., Pittsburgh.

The mill quotation is 1.60c. to 1.85c., Pittsburgh, the freight to Chicago being 38c. per 100 lb. Jobbers quote 2.85c. for plates out of stock.

Structural Material.—Bids were taken on the commercial and technical high school, Omaha, last week, a project involving 1700 tons of fabricated steel and 1000 tons of reinforcing bars. No award has been made and it is intimated that it has been decided to go ahead with only three out of the five units comprising the project. The demand for fabricated steel shows no change for the better and shops continue to name rock bottom prices to secure business. On plain material 1.60c. to 1.65c., Pittsburgh, is not unusual, but some business still brings the full official price of 1.85c. Recent fabricating awards include:

Utah Oil Refining Co., three tanks, Salt Lake City, 656 tons, to American Bridge Co.

St. Louis County, Minn., Congdon Boulevard and Babcock Highway bridges, 377 tons, to Illinois Steel Bridge Co.

Highway truss span for Leonia Bridge in Idaho, 148 tons, to Illinois Steel Bridge Co.

Music Hall, University of Minnesota, Minneapolis, 108 tons, to Crown Iron Works.

Building for new Rosary College, Oak Park, Ill., 200 tons, to Worden Allen Co.

Sixth Street bridge, Racine, Wis., 200 tons, to Worden Allen Co.

Addition, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., 80 tons, to Worden Allen Co.

Pending business includes:

Frost National Bank, San Antonio, Tex., 382 tons.

Auditorium and Music Hall, College of Industrial Arts, Denton, Tex., 225 tons.

George Washington Hotel, Washington, Pa., 1000 tons.

Western Maryland Railroad, grain elevator, Baltimore, 265 tons.

The mill quotation is 1.60c. to 1.85c., Pittsburgh, which takes a freight rate of 38c. per 100 lb. for Chicago delivery. Jobbers quote 2.88c. for materials out of warehouse.

Bolts, Nuts and Rivets.—Railroad inquiries are increasing but in most cases they call for prompt shipment to apply against immediate requirements. Business from the automobile industry is of a similar character. Some buyers, however, regard present prices as low and have asked for fourth quarter contracts to protect them against possible advances. Current quotations continue to vary widely, but with slight modifications the discounts and prices published last week are representative. Rivets have firmed up slightly since a week ago and are quoted at $2.50 for structural and $2.60 for boiler rivets. The ruling quotation on large machine bolts appears to be 70 and 10 per cent off list. Attractive inquiries are bringing out exceptionally low prices, which, however, can hardly be considered as ruling quotations. Thus a Western railroad got a price of $6.10 off list on a desirable order for blank hot pressed nuts.

Jobbers quote structural rivets, 3.68c.; boiler rivets, 3.78c.; machine bolts up to ⅞ x 4 in., 60 per cent off; larger sizes, 55 off; carriage bolts up to ⅞ x 6 in., 55 off; larger sizes, 50 and 5 off; hot pressed nuts, square and hexagon tapped, 8 off; blank nuts, $3.25 off; coach or lag screws, gimlet points, square heads, 60 per cent off. Quantity extras are unchanged.

Bars.—Keen competition has brought out wide variations in prices on mild steel bars. Quotations of 1.55c. to 1.65c., Pittsburgh, are not uncommon, but some orders have been booked at both higher and lower quotations. Railroad car repair work is resulting in the closing of some bar business and there is an encouraging number of reinforcing projects in the market. Bids will soon be taken on a sewage disposal station at Milwaukee, which calls for 1000 tons of reinforcing bars. Railroads continue to buy bar iron rather cautiously with the result that mill operations are still of an intermittent character. Prices are about the same as a week ago, possibly slightly weaker. There has been no change in the demand for rail carbon steel bars and 1.75c., mill, apears to be the top of the market.

Mill prices are: Mild steel bars, 1.55c. to 1.75c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 1.75c., Chicago; rail carbon, 1.75c., mill or Chicago.

Jobbers quote 2.78c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.20c. for rounds and 4.70c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base.

Sheets.—There is more activity in sheets than in plates, shapes or bars and prices are holding more steadily.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.53c.; No. 28 black, 4.65c.; No. 28 galvanized, 5.65c. Hoops and bands, 3.48c.

Wire Products.—Mills are maintaining the improved rate of bookings noted last week and prices are steady. Chicago, Minneapolis, St. Louis and Eastern railroads have all been buying a little more freely of late. Their purchases are confined principally to nails, barbed wire and fencing. For mill prices, see Finished Iron and Steel, f.o.b. Pittsburgh, page 435.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, $3.38 per 100 lb.; No. 9 and heavier bright basic wire, $3.53 per 100 lb.; common wire nails, $2.48 per 100 lb.; cement coated nails, $2.90 per keg.

Cast-Iron Pipe.—The Lynchburg Foundry Co., which, as was announced 2 weeks ago, was low bidder on 1500 tons for Detroit, has been awarded that tonnage. Milwaukee has let 3510 tons of pipe and fittings to the United States Cast Iron Pipe & Foundry Co. Most of the tonnage is made up of 54-in. Class C pipe, on which the accepted bid was $44.85, or approximately $35, Birmingham. The fact that so large a size brought out so high a price is regarded as evidence that the market has passed its low point and is now on a higher level. Ruling prices appear to lie between $33.50 and $36.50, Birmingham, for 6-in. and larger.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., $45.60 to $48.60; 6-in. and above, $42.60 to $45.60; class A and gas pipe, $3 extra.

O'd Material.—Steel foundries and mills are feeling out the market for material, but are reluctant to pay the prices at which dealers are now holding. As a result trading is confined largely to the sellers, who are laying in stocks at advanced quotations in the belief that the market is on an upward swing. Thus far there has been no increase in mill operations to justify this belief and improvement in foundry operation has been slight. With the market in the hands of the dealers, prices of most grades have advanced from 50c. to $1 a ton. Railroad lists include Rock Island, 3000 tons; Northern Pacific, 2000 tons; Santa Fe, 1500 tons; Chicago Great Western, 600 tons; Soo Line, 400 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$15.00 to $17.50
Relaying rails	27.50 to 30.00
Car wheels	13.00 to 13.50
Steel rails, rerolling	12.50 to 13.50
Steel rails, less than 3 ft	12.00 to 13.00
Heavy melting steel	10.75 to 11.25
Frogs, switches and guards cut apart	10.75 to 11.25
Shoveling steel	10.00 to 10.50
Low phos. heavy melting steel	13.50 to 14.00
Drop forge flashings	7.00 to 7.50
Hydraulic compressed sheet	7.00 to 7.50
Axle turnings	8.00 to 8.50
Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	14.00 to 14.50
Iron car axles	18.50 to 19.00
Steel car axles	13.00 to 13.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.25 to 6.75
Cut forge	9.50 to 10.00
Pipes and flues	6.50 to 7.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.00 to 11.50
Coil springs	13.00 to 13.50
No. 1 machinery cast	13.00 to 13.50
Low phos. punchings	11.50 to 12.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.00 to 5.50
Stove plate	11.50 to 12.00
Grate bars	10.00 to 10.50
Brake shoes	11.00 to 11.50
Railroad malleable	12.00 to 12.50
Agricultural malleable	12.50 to 13.00
Country mixed	8.50 to 9.00

Federal Judge Westenhaver yesterday disapproved the application of a number of creditors of the Standard Parts Co. for the immediate sale of the property. The court granted the application of F. A. Scott, receiver, to pay creditors 10 per cent of the amount due them. The creditors will receive about $1,000,000 at this time.

British coal raised during the 13 weeks of the miners' strike is reported at 179,100 tons, or an average of 13,800 tons per week. This compares with previous and subsequent weeks as follows:

March 12	4,277,200 tons	During strike	13,800 tons
March 19	4,240,400 tons	July 9	2,355,000 tons
March 26	3,669,000 tons	July 16	2,928,000 tons
April 2	1,950,100 tons	Dec. 18, 1920	*5,307,000 tons

*The largest weekly figure of the past year.

Opposition to the proposed pontoon bridge across the Hudson at Yonkers is based on the narrowness of the channel through the draw span. Based on a floating structure—one of the wooden ships built by the Shipping Board—such a draw could not be given so long a span as if it were supported on the rigid foundation of a permanent structure.

George J. Hagan Co., Pittsburgh, recently secured a contract from the Coonley Mfg. Co., Cicero, Ill., for a 225-kw. electric vitreous enameling furnace.

New York

NEW YORK, Aug. 16.

Pig Iron.—Some fairly good-sized orders for foundry iron have been placed within the week, a few of them running from 500 to 1000 tons. A part of the week's business went at $18, Buffalo, and $18.50, eastern Pennsylvania furnace, for No. 2 plain and about 50c. advance for No. 2 X, but these prices are now said to have been withdrawn and a few orders have been taken at 50c. and $1 a ton higher. One sale of 1000 tons for delivery in Connecticut figured back slightly under $18, Buffalo. A Buffalo steel company, which had offered iron at $18, furnace, now quotes $20 as its minimum, while an eastern Pennsylvania furnace, which sold No. 2 plain at $18.50 and No. 2 X at $19, has disposed of the block of iron which it intended to sell at these prices and has raised its quotations $1 a ton. While the demand for iron is scarcely large enough to support an advancing market, the action of producers in withdrawing their low prices has had a favorable effect upon sentiment in the trade. Some buying has been done by consumers who recognized that such low quotations could not be expected to prevail for long in view of the high producing costs; in a few instances consumers have availed themselves of the opportunity to cover their requirements for the next few months, this being the first forward buying that has been done in a considerable period, probably a year, at least. In line with a firmer tendency in pig iron prices, producers of coke have also stiffened in their quotations. Foundry coke is now quoted at $4 to $4.50, Connellsville, the former minimum of $3.75 seeming to have disappeared. At any rate it probably would require a fairly good tonnage to bring out that price again. Furnace coke is still obtainable at $2.75 to $3, Connellsville.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$22.52 to $23.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.02 to 22.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	21.52 to 22.52
Buffalo, sil. 1.75 to 2.25	24.46 to 25.46
No. 2 Virginia, sil. 1.75 to 2.25 (nom'l)	28.16 to 29.16

Ferroalloys.—New inquiries for ferromanganese continue to be reported, two of which call for 200 and 150 tons, respectively. Sales of carload lots are reported at the prevailing quotations. Demand for spiegeleisen is light and the manganese ore market is stagnant, it being impossible to sell any offerings that are available at prevailing quotations, and it is believed that 20c. per unit, seaboard, could easily be done. The 50 per cent ferrosilicon market is confined to small lot inquiries and sales at the prevailing quotations. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton	$70.00
Ferromanganese, British, seaboard, per ton	$65.00
Spiegeleisen, 20 per cent, furnace, per ton	$26.00
Ferrosilicon, 50 per cent, delivered, per ton	$65.00
Ferrotungsten, per lb. of contained metal	50c. to 55c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr.	14c.
Ferrovanadium, per lb. of contained vanadium	$4.50

Ores

Manganese ore, foreign, per unit, seaboard	20c.
Tungsten ore, per unit, in 60 per cent concentrates	$3.00 up
Chrome ore, 40 to 45 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard	$20.00 to $25.00
Chrome ore, 45 to 50 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard	$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	55c. to 60c.

Cast-Iron Pipe.—A fairly good demand for pipe from gas and water companies exists, but municipal work is unimportant. Yonkers, N. Y., will let an order this week for 230 tons. The prices quoted apply usually to carload lots; on open bids for municipal work lower quotations have been made. We quote per gross ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, $47.30; 4-in. and 5-in., $52.30; 3-in., $62.30 with $4 additional for Class A and gas pipe.

Finished Iron and Steel.—Mark Eidlitz & Co., general contractors for the new Federal Reserve Bank in New York, have asked for bids for the steel work, which will total about 15,000 tons, of which about 12,000 tons will be for the building and 3000 tons for the vaults. An addition to the Bamberger store, Newark, which originally called for 7000 tons of steel, is again in the market, the steel requirements having been pared to about 1800 tons. Three schoolhouses in Brooklyn, totaling about 1000 tons, and a building at Cornell University, Ithaca, N. Y., about 500 tons, are up for bids. No important jobs have been let within the week. More railroad car repair work is coming out, the Lehigh Valley Railroad having distributed 3200 cars among several companies as follows: American Car & Foundry Co., 1000 steel underframe box cars and 500 steel hopper cars; Magor Car Co., 1000 all wood box cars; Buffalo Steel Car Co., 500 steel hopper cars, and Lehigh Structural Steel Co., 200 steel hopper cars. About 6000 tons of steel will be required for the work. The Delaware, Lackawanna & Western has divided orders for 1500 cars for repair among the Buffalo Steel Car Co., Magor Car Co. and American Car & Foundry Co., 500 to each. The Pittsburgh & West Virginia has awarded an order for the repair of 250 steel hopper cars to the Pressed Steel Car Co. The Chicago, Rock Island & Pacific is in the market for 200 new composite gondola cars and the Kansas, Oklahoma & Gulf is inquiring for 250 gondolas. The inquiry of the Western Maryland Railroad for 5000 new car bodies is still active, and the order may be placed shortly. The demand for finished steel continues very light. Though some in the trade believe that prices are firmer than they have been for some months, there is not sufficient business in the market to indicate any definite trend one way or another. Some of the mills appear to be holding firmly at 1.75c. for steel bars and 1.85c. for plates and shapes, but there are intimations that these prices have been shaded from $1 to $3 a ton, particularly on plates, for which there is almost no demand worth mentioning. Some of the car repair work recently let and noted in this paragraph may bring out a few inquiries. Bar iron is available at 1.70c., Pittsburgh, but demand is limited to very small lots.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.13c.; plates, 2.18c. to 2.23c.; structural shapes, 2.18c. to 2.23c.; bar iron, 2.08c.

Old Material.—A distinctly better tone is evident in the market, according to most dealers, despite the fact that order books show little change for the better. A tonnage of 1500 to 2000 tons of relaying rails was offered last week by the New York Central Railroad and is said to have been placed. A railroad recently sold a tonnage of scrap at $1.25 per ton higher price than was obtained for the same kind of material on Aug. 2. There is practically no buying by local foundries and prices of dealers for this purpose are largely nominal.

Buying prices per gross ton, New York, follow:

Heavy melting steel	$7.50 to $8.75
Rerolling rails	10.00 to 10.50
Relaying rails, nominal	37.50 to 40.00
Steel car axles	10.00 to 11.00
Iron car axles	16.00 to 17.00
No. 1 railroad wrought	10.50 to 11.00
Wrought iron track	7.50 to 8.75
Forge fire	5.00 to 5.50
No. 1 yard wrought, long	9.00 to 9.50
Light iron	2.00 to 2.50
Cast borings (clean)	5.00 to 5.50
Machine-shop turnings	2.50 to 3.50
Mixed borings and turnings	2.50 to 3.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	8.00 to 8.50
Stove plate	8.50 to 9.50
Locomotive grate bars	8.50 to 9.25
Malleable cast (railroad)	8.50 to 9.00
Car wheels	11.00 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$16.00 to $17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.00 to 16.00
No. 1 heavy cast, not cupola size	14.00 to 15.00
No. 2 cast (radiators, cast boilers, etc.)	9.50 to 10.50

Warehouse Business.—Although there is a more optimistic tone to the market, inquiries continue in about the same volume. Prices are unchanged, all warehouses meeting competition where necessary. Galvanized sheets have registered another slight decline, No. 28 gage being obtainable as low as 5c. per lb.,

although the majority of warehouses continue to quote 5.25c. per lb. Brass and copper warehouses report no change, except for copper sheets, which in some cases are quoted as low as 20c. per lb. Sales of wrought iron and steel pipe show no increase, but some dealers expect August to show better results than July, which was extremely dull. We quote prices on page 450.

High Speed Steel.—The market is entirely nominal, 18 per cent tungsten high speed steel continuing at 90c. to $1 per lb., New York, with sales reported under special conditions at slightly lower prices. Inquiries show a slight increase.

St. Louis

ST. LOUIS, Aug. 16.

Pig Iron.—An improvement in the pig iron market is indicated by some heavy buying during the week at increased prices. The St. Louis Coke & Chemical Co. reported on Wednesday the sale of 6250 tons of foundry iron at the market levels of $22.88 to $23.38, f.o.b. St. Louis. Most of this was of 1.75 to 2.25 per cent silicon. The sales were made in lots ranging from 1250 to 2000 tons. This company also sold a number of smaller lots of up to 100 tons. Local brokers purchased from another concern 3500 tons of foundry iron at $18.50, f.o.b. Chicago. Foundries catering to railroad work are increasing activities. The Southern Wheel Co., St. Louis, which has been running as low as 10 per cent of normal, is now operating at a 50 per cent rate. The Mt. Vernon (Ill.) Car Works are now operating at full capacity; the Hannibal (Mo.) Car Wheel Co. has resumed operations after having been shut down for some time, and the Barry Iron & Steel Co., St. Joseph, Mo., is now operating. A survey made of the Davenport, Ia., Tri-cities district indicates some improvement in the agricultural implement district. Their stocks are low and they are buying a few cars of foundry iron. Other inquiries are out, and there is generally a better feeling in the pig iron market. The sale is reported of one car of Bessemer ferrosilicon at about $40 and one car of ferromanganese at about $75. There is an inquiry out for another car load of ferromanganese.

We quote delivered consumers' yards St. Louis as follows, having added to furnace prices $2.80 freight from Chicago and $5.74 from Birmingham:

Northern foundry No. 2	$22.88 to $23.38
Northern malleable	22.88 to 23.38
Basic	22.88 to 23.38
Southern foundry, sil. 1.75 to 2.25	24.74 to 25.74

Finished Iron and Steel.—The market has not shown the activity manifested in the pig iron trade. Local fabricators are figuring on several large-sized jobs and are hopeful. The most important development of the week was the placing of an order for 3000 tons of tie plates by the Missouri Pacific with the Illinois Steel Co. The Missouri Pacific also purchased 2000 kegs of track spikes at a reported price of $2.50, f.o.b. Pittsburgh. The requirements for the new Federal Reserve Bank Building will be approximately 3000 tons of structural steel and 350 tons of reinforcing bars. A very slight improvement is noted in the demand for warehouse steel.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.62½c.; No. 28 black sheets, cold rolled, one pass, 4.75c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, 3.77½c. per 100 lb.; boiler rivets, 3.87½c.; tank rivets, 7/16 in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-5 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, $3.25; and tapped, $3.00 off list.

Coke.—An increase in the number of inquiries for coke is reported not only from local consumers but from outlying territory. There is an inquiry out for 2500 tons from a Western smelter and one for 5000 tons from an Illinois operator, with various other requests of from 300 to 400 tons. Consumers in some instances are asking now for shipment of orders that had been temporarily held up. Prices are unchanged. Standard Connellsville foundry coke is being quoted at $4 to $4.50 ovens, with special brands up to $5.25, and the furnace product $1 lower.

Old Material.—There has been a decidedly better tone, due to the fact that some dealers have been buying railroad material at advanced quotations with the expectation of a rise in the market. However, all of the large consumers still decline to pay any advance for material, contending that the small amount of business on their books does not justify any advance in old material prices. It will be necessary for dealers either to lay this material down in their yards or sell at a loss to consumers. The following railroad lists are before the market this week: Baltimore & Ohio, 9000 tons; Great Northern, 2000 tons; Northern Pacific, 2500 tons; C. I. & L. Railway, 800 tons; Kansas City Southern, 150 tons.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	$12.50 to $13.00
Steel rails, rerolling	11.50 to 12.00
Steel rails, less than 3 ft	10.00 to 10.50
Relaying rails, standard section	28.00 to 30.00
Cast iron wheels	11.00 to 11.50
No. 1 heavy railroad melting steel	9.50 to 10.00
No. 1 heavy shoveling steel	9.00 to 9.50
Ordinary shoveling steel	8.50 to 9.00
Frogs, switches and guards, cut apart	9.50 to 10.00
Ordinary bundle sheet	4.00 to 4.50
Per Net Ton	
Heavy axle and tire turnings	$5.50 to $6.00
Iron angle bars	10.50 to 11.00
Steel angle bars	8.00 to 8.50
Iron car axles	16.00 to 16.50
Steel car axles	12.00 to 12.50
Wrought iron arch bars and transoms	12.50 to 13.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	9.50 to 10.00
Steel couplers and knuckles	9.50 to 10.00
Locomotive tires, 42 in. and over, smooth inside	8.50 to 9.00
No. 1 dealers' forge	6.00 to 6.50
Cast iron borings	5.50 to 6.00
No. 1 busheling	9.50 to 10.00
No. 1 boilers cut in sheets and rings	5.50 to 6.00
No. 1 railroad cast	11.50 to 12.00
Stove plate and light cast	10.50 to 11.00
Railroad malleable	9.00 to 9.50
Agricultural malleable	9.00 to 9.50
Pipes and flues	6.50 to 7.00
Heavy railroad sheet and tank	6.00 to 6.50
Light railroad sheet	3.00 to 3.50
Railroad grate bars	7.50 to 8.00
Machine shop turnings	4.00 to 4.50
Country mixed iron	7.00 to 7.50
Uncut railroad mixed	7.50 to 8.00
Horseshoes	9.50 to 10.00
Railroad brake shoes	8.00 to 8.50

Buffalo

BUFFALO, Aug. 16.

Pig Iron.—Announcement by a steel interest last week of intention to enter the selling field in foundry iron was followed by considerable business; approximately 18,000 tons of various grades were sold within the week at a base price ranging from $18.50 to $19.50. One of these sales was a lot of 5000 tons to an Eastern buyer. Other producers though encouraged have not found a great deal of buying. A sale of 200 tons of low silicon iron at $20 represents the sole transaction with one furnace but it received a number of inquiries from buyers who have been out of the market for some months. Inquiry and sales have fallen off; the total tonnage involved in inquiries is 20 per cent less than for the previous week. While the tendency of local producers is to refrain from future commitments, there is rumor of a sale of 1500 tons for delivery in April, 1922, at a price of $18.50. A furnace blown in Aug. 1 and producing basic iron may turn out foundry iron after its basic needs are filled.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	$20.75 to $21.75
No. 2X foundry, 2.25 to 2.75 sil	19.75 to 20.75
No. 2 plain, 1.75 to 2.25 sil	19.00 to 20.00
Basic (nominal)	20.00 to 21.00
Malleable (nominal)	21.00 to 22.00
Lake Superior charcoal	36.00

Finished Iron and Steel.—There is little question that there is a greater volume of business with a

majority of sellers. In pipe and tubular products, structural shapes, sheet piling and wire, the improvement is manifest and there has been some increased demand for cold rolled material calling for immediate delivery. An interest sold 800 tons of billets, its first sale of this material this year. Several good-sized structural jobs, including one requiring more than 1000 tons of reinforcing bars for a terminal elevator in Baltimore, are noted. One inquiry is for 500 tons of bars for a Rochester apartment house. Tin plate inquiry is quiet and the same apathy in bolts and nuts is still shown. In black, galvanized and blue annealed sheets an increase is perceptible. A number of pipe inquiries in Canada for export are receiving attention. With one mill there is little moving in bars, plates or shapes, but up to date the current month shows improvement over its predecessor. Each mill of the largest local interest will run for a time in August.

Warehouse Business.—Increases in orders and inquiry continues with especially good business in sheets and structural shapes. Prices seem to be in favor and the tonnage per order shows improvement. Speculation is about evenly divided as to the possibility of any further price reductions. The better movement out of warehouses is regarded as more definite than any previous flurries this year.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.90c.; plates, 2.90c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.80c.; hoops, 3.50c.; blue annealed sheets No. 10 gage 3.45c.; galvanized steel sheets, No. 28 gage, 5.30c.; black sheets, No. 28 gage, 4.30c.; cold rolled strip steel, 6.40c.

Old Material.—There is a more optimistic feeling and general belief that a more lively market is within sight. Inquiry has been received from points in the Pittsburgh and Valley districts for steel, borings and turnings. However, they are regarded as of much value to Buffalo dealers as the freight rate is prohibitive; they would have to sell steel at a figure near $8 to compete for the business. The general tendency is not to sell below the present quotation, about $10.50.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$10.00 to $11.00
Low phos., 0.004 and under	14.50 to 15.50
No. 1 railroad wrought	12.00 to 13.00
Car wheels	13.00 to 14.00
Machine shop turnings	4.00 to 5.00
Cast iron borings	4.00 to 5.00
Heavy axle turnings	8.00 to 9.00
Grate bars	8.00 to 9.00
No. 1 busheling	9.00 to 10.00
Stove plate	11.00 to 12.00
Bundled sheet stampings	6.00 to 7.00
No. 1 machinery cast	14.00 to 15.00

Birmingham

BIRMINGHAM, Aug. 16.

Pig Iron.—Sales of the past week did not total large, but the $19 base was maintained consistently and efforts to obtain concessions were futile. One maker sold 1000 tons in the first three days of the week, one order being for 300 tons for export out of New Orleans, two for 100 tons and the remainder for carload lots. Melters who wished a certain analysis and could not get that accepted the nearest substitute. Nearby consumers, who declared they would not buy at $19, wired orders at that base shortly after declining to place orders at that figure. The ill-assortment of stocks has produced its effect among the buyers. The disposition to get into the market for more than immediate requirements is beginning to manifest itself. Southern foundries are melting more iron. The market can the better afford to be stiff because it is confined to the South at this time owing to freight rates. The cast iron pipe makers seem on the eve of purchasing heavily following an increase in bookings that seems imminent. The melt of radiator plants and stove works is also larger than it has been. American sugar refineries have placed orders for considerable machinery in this district and that requires much iron. Southern iron makers will be slow in resuming, preferring to lose a little business in the hope of a market somewhat above the present level. The Woodward Iron Co. is understood to have the business in sight for the operation of its two merchant stacks. Several export inquiries have been received, but destination is not known. The Pacific Coast continues to take small amounts of iron on vessels taking cargoes of pipe and steel out of Mobile for that destination.

We quote per gross ton f.o.b. Birmingham district furnace as follows:

Foundry, sil. 1.75 to 2.25	$19.00
Basic	18.50
Charcoal	32.00

Cast-Iron Pipe.—Phoenix, Ariz., has sent in specifications for 3000 tons of pipe to the United States Cast Iron Pipe & Foundry Co., and the National Cast Iron Pipe & Foundry Co. has taken numerous Middle West orders and is operating at around capacity. The Pacific Coast is taking about 4000 tons of high pressure pipe from the United States, the American, and the National companies. The base remains at $35 for 6 in. and upward, following acceptance of some business under that. The market seems to be hardening.

Finished Material.—The Tennessee company will operate its Bessemer plate mill in full this week in addition to continuing a rate of 50 per cent of capacity in other finishing mills. It has a rush order for 13,000 tons of heavy rails for the Huan Shan railroad in China. The order for 12,000 tons for Manchurian railroads has been delivered. The delivery of 12,000 tons of rails to Alaska will be completed out of Mobile this week. Ingalls Iron Works, steel fabricators, are at capacity on office and industrial buildings. The Gulf States Company's blooming mill resumed this week. Demand for wire mill products and for sheets has improved. Jobbers in the Southeast are placing larger orders.

Old Material.—Inquiries for stove plate and cast are fairly good, but steel remains inactive. Dealers have small stocks owing to heavy freight rates, which discourage country sellers from sending in supplies. Offers of 1000 cars of scrap from sawmills were not accepted on this account. Except as to stove plate and cast scrap the price list is nominal.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Steel rails	$10.00 to $11.00
No. 1 steel	9.00 to 10.00
No. 1 cast	15.00 to 16.00
Car wheels	15.00 to 16.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	13.00 to 14.00
Stove plate	9.00 to 10.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Cincinnati

CINCINNATI, Aug. 16.

Pig Iron.—The stiffening of prices in the Chicago market, while it undoubtedly had the effect of bringing out some tonnage for immediate shipment, has not stimulated buying to any great extent. There is some evidence, however, that the situation is improving, as there is more demand for malleable iron and alloys. Stove foundries are now increasing their melt, and it is expected that inquiries from this source will soon be received. During the early part of the week some fair tonnages were disposed of. An Indiana melter took 1000 tons of malleable iron, and a northern Ohio melter 400 tons of foundry. An eastern Ohio interest was a purchaser of 300 tons of Buffalo iron and a West Virginia melter bought 200 tons of southern Ohio iron. Several sales of from 100 to 200 tons were made in this territory, several of them being made on the basis of $20, Chicago furnace. There is very little interest in Southern iron, and while reports are current that $18 has been quoted, there is apparently no foundation for them, as most furnaces are holding firm at $19. In the southern Ohio district the market remains firm at $20 to $20.50 with no disposition to quote these prices for extended delivery. One interest in the last few days turned down offers to buy 1000 tons for delivery during the rest of the year at today's prices.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$23.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	24.00
Ohio silvery, 8 per cent sil.	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	22.52
Basic, Northern	21.52
Malleable	22.52

Finished Material.—An inquiry for approximately 1000 tons of plates and 500 tons of structural shapes has been received from a manufacturer in this district. A Kentucky oil company is understood to have placed a number of oil tanks with an Eastern manufacturer. The tonnage of plates involved was about 900 tons. Some small inquiries for bars and shapes are also being figured on. There is no indication of lower quoted prices than those published recently, although on an attractive tonnage it is said that 1.65c. for bars and from 1.70c. to 1.75c. on plates can be done. Some sheet inquiries have been received and while they are mostly for carload lots for immediate shipment, several 100-ton inquiries are before the trade. While there are reports that prices on sheets are being shaded, most of the orders being placed are at 2.40c. for blue annealed, 3c. for black and 4c. for galvanized. A jobber in this district is reported to have placed an order for 10,000 kegs of nails on the basis of $2.50 per keg, Pittsburgh. Some low prices are being made on light rails and bolts and nuts. It is said that 1.55c. can be done on light rails from some of the smaller mills. Some small orders are being placed and in some instances the full price of 1.85c. was secured. The Big Four Railroad is taking bids on 16,300 angle bars. It is understood that this road has purchased 2500 tons of tie plates from Pittsburgh and Chicago manufacturers. There are no structural inquiries of any size, and no awards have been made. A school building at Dayton, Ohio, which was to have been up shortly, has been postponed indefinitely. The First National Bank of Ashland, Ky., is having plans prepared by Payton, Ohio, architects for an 11-story office building. Plant operations will not materially change during the week. The American Rolling Mill Co. at Middletown, will have 10 sheet mills on. The sheet mill of the Ashland Iron & Mining Co., Ashland, Ky., is running at approximately 50 per cent of capacity and the plant of the Ashland Steel Co. will run full for this week.

Warehouse Business.—Local warehouses report business as spotty. One day there will be a flurry but the next day business will fall off to practically nothing. Only small orders are being received. No price changes have been made since the ones quoted last week.

Iron and steel bars, 3c. base; hoops and bands, 3.75c. base; shapes, 2.85c base; plates, 2.85c. base; reinforcing bars 3.07½c. base; cold rolled rounds, 1½ in. and larger, 4.25c.; and ¼ to 1½ in. and flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 3.50c.; No. 28 black sheets, 5c.; No. 28 galvanized sheets, 5.75c.; wire nails, $3.25 per keg base; No. 9 annealed wire, $3.00 per 100 lb.

Coke.—The coke market is dull. A sale of 600 tons of foundry coke was made at $4.50 per net ton Connelsville ovens, and another of 200 tons at $4.15. Producers are less anxious to quote for forward delivery than has been the case recently. Prices are unchanged from last week.

Old Material.—Speculative buying by dealers has given the scrap market some show of activity, but while the price situation may have a firmer tendency, prices are unchanged. Some inquiries for heavy melting steel are being figured on, but the tonnages are not large. There is practically nothing moving in foundry scrap.

We quote dealers' buying prices:

	Per Gross Ton	
Bundled sheets	$4.00 to	$5.00
Iron rails	11.00 to	12.00
Relaying rails, 50 lb. and up	25.00 to	26.00
Rerolling steel rails	10.00 to	11.00
Heavy melting steel	8.50 to	9.50
Steel rails for melting	9.00 to	10.00
Car wheels	11.50 to	12.50
	Per Net Ton	
No. 1 railroad wrought	8.50 to	9.50
Cast borings	2.00 to	2.50
Steel turnings	1.00 to	2.00
Railroad cast	11.00 to	12.00
No. 1 machinery	12.00 to	13.00
Burnt scrap	6.50 to	7.50
Iron axles	15.00 to	16.00
Locomotive tires (smooth inside)	8.50 to	9.50
Tires and flues	4.00 to	5.00

Strikers in Pennsylvania lost $25,413,305 in wages alone, during the first six months of 1921, according to figures compiled by the State Department of Labor and Industry. This loss, resulting from 323 strikes, is said to be greater than the amount for any previous full year, since the figures began to be compiled, in 1916.

Cleveland

CLEVELAND, Aug. 16.

Iron Ore.—All of the older ore selling companies are vigorously opposed to any reduction in prices of ore, and buyers, as a rule, are not urging such action. It is true that one company, which within a few years established offices in Duluth and Cleveland, has offered to sell at a large reduction from the prevailing rates, but no sales are reported and it is not believed that a general reduction would stimulate the market; it is feared that it would cause some banks to ask for additional security on ore on which money has been loaned. The movement continues light and one important shipper which owns 28 vessels and has had six in commission, has now tied up two of the six.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $6.45; Old range non-Bessemer, 51½ per cent iron, $5.70; Mesabi Bessemer, 55 per cent iron, $6.20; Mesabi non-Bessemer, 51½ per cent iron, $5.55.

Pig Iron.—Looking at the market from week to week, it is not so easy to see much change, but taking into consideration a period of several months and all of the territory covered by Cleveland agencies, it is clear that a noteworthy change for the better has taken place. In some cases, sales have increased in three months from 50 to 75 per cent and shipments from 70 to 100 per cent. This week in the immediate Cleveland district, sales are light and shipments fair, but numerous inquiries have been received from, and a considerable number of sales made to, customers outside of the immediate district. A sanitary company has purchased 1000 tons of foundry iron on the basis of $20.50, Valley. Numerous sales have been made from $20.50 to $21, Valley. Some buyers are expressing a willingness to take contracts for round tonnages to be delivered during the next six months at present quotations, but furnaces are slow in making contracts so far in advance.

We quote delivered Cleveland as follows, based on the new freight rate, there being a 56c. switching charge for local iron, a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and $6.67 from Birmingham:

Basic		$19.96
Northern No. 2 fdy., sil. 1.75 to 2.25	$20.00 to	20.50
Southern fdy., sil. 2.25 to 2.75		26.92
Ohio silvery, sil. 8 per cent		30.86
Standard low phos., Valley furnace	36.00 to	36.25

Finished Iron and Steel.—The decision rendered by the Interstate Commerce Commission at Washington yesterday, refusing to authorize the issuing of $60,000,000 in bonds for the construction of the terminal on the Public Square, Cleveland, has removed from the market the largest pending structural contract. The original estimate was for 60,000 tons of shapes, plates and bars. If this project should ever be carried out it will be in the distant future. The 15,000 tons of steel for the Union Trust Co. building is being fabricated, delivered and stored by the American Bridge Co., but unlike the terminal project this one may go forward next year. Reports as to what, if any, progress has been made in the market the past week are conflicting. Most of the mills report a very moderate increase in buying. The car repair work recently awarded, some being taken in this district, has proved disappointing as far as new steel business is concerned, as most of the shops have plenty of steel in stock and they are using it. Prices are perhaps a little bit steadier, but reports of 1.75c. on plates continue to be heard. On hot rolled strips 2.25c. is still quoted. On a power plant at Ashtabula calling for 250 tons of structural steel, the McClintic-Marshall Co. is low bidder. Bids will soon be called for a number of school buildings in Cleveland and vicinity.

Bolts, Nuts and Rivets.—Cleveland manufacturers report a moderate improvement in business, especially in bolts and nuts, and are declining to meet concessions reported in other markets. Rivet manufacturers say that even if it is necessary to continue the present low rate of production, they will not meet the very low prices reported elsewhere.

Sheets.—The Canton Sheet Steel Co., Canton, Ohio, will resume operations in a few days and is buying sheet bars, which the mills have promised to deliver very quickly to meet early requirements. Quotations on sheets remain unchanged at 3c. for No. 28 black, 4c. for No. 28 galvanized and 2.25c. to 2.40c. for No. 10 blue annealed.

Warehouse Business.—Recent reductions in prices have brought out little if any new business and jobbers report the market extremely dull.

Jobbers quote steel bars, 2.64c.; plates and structural shapes, 2.74c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 4c.; No. 28 galvanized sheets, 5c.; No. 10 blue annealed sheets, 3.25c.; hoops and bands, 3.29c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Old Material.—Activity among dealers indicates that they at least believe that conditions are improving and there also has been a fair amount of buying by consumers. The result is that nearly all prices have advanced and $12.25 seems to be the minimum on heavy melting steel. Other grades show advances of from 25 to 75 cents.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel	$12.25 to $12.75
Steel rails, under 3 ft	12.75 to 13.25
Steel rails, rerolling	14.25 to 14.75
Iron rails	11.00 to 12.00
Iron car axles	18.00 to 19.00
Low phosphorus melting scrap	12.50 to 13.00
Cast borings	7.25 to 7.75
Machine shop turnings	6.00 to 6.50
Mixed borings and short turnings	7.00 to 7.50
Compressed steel	7.00 to 8.00
Railroad wrought	12.00 to 12.50
Railroad malleable	12.00 to 12.75
Light bundled sheet stampings	4.50 to 5.00
Steel axle turnings	9.25 to 9.75
No. 1 cast	16.00 to 16.50
No. 1 busheling	7.50 to 8.00
Drop forge flashings, over 10 in	5.50 to 6.00
Drop forge flashings, under 10 in	6.00 to 6.50
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	6.50 to 7.50

Youngstown

YOUNGSTOWN, OHIO, Aug. 16.

Steel market in this district is still hesitant, though it is much improved over a month ago. The Brier Hill Steel Co. has followed the action of Inland Steel in advancing the price of standard basic pig iron to $20, though the $18 base is still being quoted by other steel works interests.

Through inability to meet delivery requirements, a district sheet maker was compelled to turn down an order for 10 carloads of galvanized sheets offered at 4c. Recent improved buying of steel products has strengthened the scrap market and prices are up from $1 to $1.50 per ton. In finished products sheets are most active.

The Youngstown Sheet & Tube Co., which is supplying the by-product coke for Mary blast furnace at Lowellville of the Sharon Steel Hoop Co., has added a third battery of by-product coke ovens to the active list, making three of six batteries in commission. The gas is being consumed in the pipe furnaces. Previous to its suspension, the Mary stack was run on beehive coke.

An encouraging feature of the black sheet market is the volume of inquiry from consumers in widely separated sections, who have been out of the market indefinitely in many cases. One maker is now rolling an order for 480 tons of black and has another for 350 tons. Several orders involving in excess of 200 tons are now going through the mills. Most of the transactions involve business up to 500 tons.

While jobbers have entered the market more freely, they are still buying largely against requirements and no general buying movement is as yet under way to replenish depleted stocks. Stocks in many cases are unbalanced, while in others they are exhausted.

More activity is being displayed in the strip market, though the Ford Motor Co. continues to take the bulk of the output of the leading district maker. Other interests, however, are entering the market in a quiet way. The price range in hot strip is from 2.25c. to 2.40c., with the spread on cold-rolled from 4c. to 4.25c.

Due to recent revival in buying, manufacturers have made substantial reductions in stocks, especially in sheet accumulations, the price reductions constituting a controlling factor in such movement. One independent interest, for instance, in this territory, recently sold several thousand tons of sheets from warehouse stocks, leaving it only about 3000 tons of such material. This applies to other finished commodities as well, especially where the orders are for small tonnages. Such business is usually transmitted directly from the order departments to the shipping department, and frequently the tonnage is shipped the same day the order is telegraphed. But for this fact, revival in buying the past three weeks would have produced a much larger operating rate.

One maker is rolling No. 9 gage sheet material for frame stock for the Ford Motor Co., this being a small preliminary order to be followed by others if the material is satisfactory. Existing schedules are being largely supported by demand from the automobile trade and any drop in that demand is certain to be immediately reflected in the Valley steel situation.

In the pipe market, lap weld continues to feel the effect of competition from the resale market in the oil fields. Comparatively large tonnages of lap weld pipe have recently been rolled for export to Mexico, while some European pipe has been produced. Butt weld pipe, however, continues to support production in large measure.

Price uncertainties still prevail in plates, the minimum in the Valley being apparently 1.70c., though other makers farther west are quoting lower prices. It is certain that Valley producers would have to make further concessions on attractive tonnage. The plate market is still spotty.

Consumers of tin plate are specifying against contracts but doing little new buying. The price of $5.25 per base box is generally being observed for production plate, though stock plate has sold down to $4.75.

Most of the business in steel bars at this time is coming from the automobile industry for rim sections calling for light material. Some railroad bar business is coming through. The 1.75c. base is being sustained.

Though $32 has been the basis for most of the transactions in sheet bars, the market is definitely trending to a $30 level. Non-integrated sheet makers are taking heavier tonnages.

Activity in the scrap market follows general improvement in steel buying. One company has purchased 2000 tons of hydraulically compressed scrap at prices ranging from $9 to $10.50. Another interest has taken 1000 tons of heavy melting. The market is $10.50 to $11 for hydraulic scrap and $12.75 to $14 for heavy melting.

Boston

BOSTON, Aug. 16.

Pig Iron.—The Whitin Machine Works, Whitingsville, Mass., textile machinery, this week was in the market for 3000 tons of iron, silicon 2.00 to 2.50 per cent, but as far as known has not covered. One 400-ton lot of Buffalo No. 1X sold at $18.50, furnace, and a like lot of eastern Pennsylvania at a low figure to Massachusetts consumers. Inquiries and actual sales otherwise appear to have dwindled to car lots. Buffalo $18.50 iron has disappeared from this market, the company heretofore quoting on that basis now asking $20, furnace for No. 2 plain and No. 2X. Eastern Pennsylvania $18.50 iron also has practically disappeared, and No. 2 plain and No. 2X are now obtainable at $19 and No. 1X for $21, where round tonnages are involved. It is generally conceded by sellers that with the Whitin Machine Works business out of the way, $18.50 eastern Pennsylvania iron will have passed from the New England field. Car lots of eastern Pennsylvania No. 1X sold this week as high as $24.50 furnace and No. 2X at $23.50. One carload of malleable iron was taken by a Massachusetts melter at $19.50, furnace. Those furnaces heretofore offering iron at $18.50 are understood to have secured a sufficient backlog to insure

operations for some time. Delivered pig iron prices follow:

East. Penn., silicon 2.25 to 2.75	$23.06 to $25.56
East. Penn., silicon 1.75 to 2.25	23.06 to 25.06
Buffalo, silicon 2.25 to 2.75	24.46 to 25.96
Buffalo, silicon 1.75 to 2.25	24.46 to 25.46
Virginia, silicon 2.25 to 2.75	31.08 to 33.08
Virginia, silicon 1.75 to 2.25	30.58 to 32.58
Alabama, silicon 2.25 to 2.75	30.16 to 31.16
Alabama, silicon 1.75 to 2.25	29.66 to 30.66

Finished Material.—A slump is noted in structural prospects and 2000 to 3000 tons figured on the past month remains uncovered. McClinitic-Marshall Co. has been awarded 190 tons for an Ansonia, Conn. electric plant. The Boston Structural Steel Co., Inc., Cambridge, Mass., is low bidder on 100 tons for a Great Northern Paper Co. machine shop. It recently was awarded 150 tons for a Northampton, Mass., college building, 100 tons for a Watertown, Mass., school, and about 100 tons for the Atlantic Dye Co., Millington, N. H. Stone & Webster have asked bids on 200 tons for the Ford, Green Island, N. Y., plant. The Lancaster Iron Works, Inc., Lancaster, Pa., is awarded 100 tons sheared plates for water pipes, Searsburg, Vt. Most mills quote plates at 1.85c., Pittsburgh, but 1.75c., was recently named. A Japanese consumer is inquiring on 350 tons, 3 x 6 ft., heavy gage blue annealed sheets. Domestic sheet business is confined to an occasional car-lot. Local July bar bookings were larger than those for June, and August will go well above July.

Warehouse Business.—While consumption of warehouse products in general throughout New England has not increased noticeably this month, better business is hoped for after Labor Day. Stocks of iron and steel bars and hoops and bands are gradually working downward and in certain cases are broken. Those of structural, plates and sheets show little shrinkage from week to week. Large stocks, coupled with keen competition for trade, have forced reductions of 5 to 10 per cent in machine and common carriage bolts and cap and set screws. The market appears amply supplied with wire and cut nails.

Jobbers now quote: Soft steel bars, $2.81½ per 100 lb. base; flats, $3.83 to $3.93; concrete bars, $2.50 to $3.09; tire steel, $4.20 to $4.70; spring steel, open hearth, $5.25; crucible, $11.50; steel bands, $3.46½ to $3.98; steel hoops, $4.18; toe calk steel, $5.25; cold rolled steel, $4.15 to $4.65; structural steel, $2.81½ to $2.96½; plates, $2.91½ to $3.10; No. 10 blue annealed sheets, $3.73; No. 28 black sheets, $4.75; No. 28 galvanized sheets, $5.75; refined iron, $2.83 to $4.75; best refined, $4.75; Wayne iron, $7; Norway iron, round, ¼-in. to 2½-in., 7.10c. per lb. net; other sizes, 7.75c. base.

Old Material.—The market for machinery cast is stronger, based on larger inquiries and purchases. Prices for cotton machinery cast are $1.50 to $2 under those for straight metal working machinery cast, the latter being in light supply. Little stove plate is available and prices are higher. Railroad malleable, although inactive, has strengthened with machinery cast and stove plate. Both New England and Pennsylvania consumers are buying borings more freely, one broker alone reporting sales of nine cars this week. On the other hand, machine shop turnings, forged scrap, bundled skeleton, street car axles and shafting have little, if any, call and quotations are largely nominal. One house sold a small tonnage of heavy street railway rails at 1c. per lb. at shipping point, otherwise the market for this old material is quiet. Pennsylvania mills will buy any tonnage of heavy melting steel available at $6.50, but yards, as a rule, are not willing to let go at any such figure.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$17.50 to $20.00
No. 2 machinery cast	15.50 to 17.50
Stove plate	16.00 to 17.00
Railroad malleable	15.50 to 16.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$5.50 to $6.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	8.50 to 9.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	7.50 to 8.00
Machine shop turnings	2.50 to 3.00
Cast iron borings, rolling mill	3.50 to 4.50
Cast iron borings, chemical	3.50 to 4.50
Blast furnace borings and turnings	2.50 to 3.00
Forged scrap and bundled skeleton	5.00 to 5.50
Street car axles and shafting	12.00 to 12.50
Car wheels	11.00 to 11.50
Rerolling rails	9.00 to 10.00

Philadelphia

PHILADELPHIA, Aug. 16.

A decidedly better tone is in evidence, particularly in the local pig iron trade, which has been encouraged by the marked betterment of demand within the past few weeks. Another week in which sales have exceeded 15,000 tons, including 7000 tons of steel-making iron, has placed the few Eastern furnaces which are in blast in a fairly comfortable position for the next few weeks. The extremely low prices on foundry iron have disappeared and foundry grades are at least 50c. a ton higher than last week with the possibility that the low-priced sellers may put up their prices another half dollar within the week.

Pig Iron.—Another week of fairly good pig iron sales has served to create a better sentiment among sellers, and this is reflected in slightly higher prices on foundry grades. Apparently all of the 10,000 tons of iron which was thrown upon the market by an eastern Pennsylvania furnace at prices based on $18.50, furnace, for No. 2 plain has been disposed of and this maker has advanced its prices 50c. per ton, now quoting $19, furnace, for No. 2 plain and $19.50, furnace, for No. 2X, with the possibility that another 50c. advance may be made before the end of the week. Two other Eastern makers of foundry iron are quoting $20, furnace, for No. 2X, and some business has been closed on this basis. Two factors stand out prominently in the present market situation. One is the apparent determination of producers to go no lower and the other is the increasing interest taken by those consumers who believe that pig iron is a "good buy" at present prices. The few furnaces in blast in eastern Pennsylvania were unable to sell all they were making a few weeks ago, but now they are comfortably fixed for the next three or four weeks and are booking new orders at a rate equal to or in excess of their output. The largest purchase of the past week was 5000 tons of basic iron by a Harrisburg consumer, the price being about $19.50, delivered. A later sale of 2000 tons of basic to a Delaware plate manufacturer established a lower delivered price, namely $19. Sales of foundry iron have been in lots ranging from a carload to 1000 tons. A Lansdale, Pa., foundry is reported to have purchased about 1500 tons. There have been several sales of 500 tons or more. Pig iron producers and selling agents are firmly of the opinion that the turn has come in the pig iron situation, and they are considerably cheered by reports of higher prices at Buffalo, Chicago and elsewhere.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$19.84 to $21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.34 to 21.26
Virginia No. 2 plain, 1.75 to 2.75 sil.	28.74
Virginia No. 2X, 2.25 to 2.75 sil.	29.74
Basic deliv. eastern Pa.	19.00
Gray forge	22.00 to 23.00
Malleable	22.00 to 23.00
Standard low phos. (f.o.b. furnace)	36.50
Copper bearing low phos. (f.o.b. furnace)	35.00

Ferroalloys.—A slightly better inquiry for ferromanganese is reported. A sale is reported at about $68, delivered, for a single carload. American producers continue to quote $70, delivered as far west as the Pittsburgh district, and $75, delivered in the Chicago district. Spiegeleisen, 18 to 22 per cent, is quoted at $27, furnace.

Semi-Finished Steel.—A few sales of billets at $30, Pittsburgh, constitute the first real activity in semi-finished in some weeks. Forging billets are quoted at $35, Pittsburgh.

Plates.—No steel product is quite so inactive as plates, the demand for which is next to nothing. Prices are weak but are not well determined because of the small volume of business. On the ordinary run of small inquiries Eastern mills are disposed to quote 1.85c., Pittsburgh, but on anything attractive 1.75c. can quite easily be done and quotations of 1.70c. have been reported. The market may be quoted at 1.75c. to 1.85c., Pittsburgh.

Structural Material.—Shapes are somewhat firmer than plates, but shading of prices is occasionally reported. Two local jobs that are up for bids are a moving picture theater for the Stanley Co., 1000 tons, and an addition to the Wesley Building, 400 tons. The general contract for the Chelsea National Bank at Atlantic City has been awarded to Warren Moore & Co., who will buy the steel, about 300 tons. We quote plain material at 1.85c., Pittsbrugh.

Rivets.—Further price cutting on rivets has brought structural quality down to 2.40c. per lb., Pittsburgh, and boiler quality to 2.50c. per lb. Railroads are more active buyers for car repair work.

Bars.—Soft steel bars are quite firmly held at 1.75c., Pittsburgh. A fair amount of buying of carload lots is reported. Bar iron is available at 1.70c., Pittsbrugh.

Sheets.—On small lots of blue annealed 2.40c., Pittsburgh, is the usual quotation, but on larger lots 2.25c. can be done. Black sheets are quoted at 2.90c. to 3. and galvanized sheets at 3.85c. to 4c., Pittsburgh.

Wire Products.—The price of wire nails is being firmly held at $2.75 per 100 lb. keg, Pittsburgh, and other wire products are also firm. A fair business in nails is being done.

Warehouse Business.—A slightly improved demand for steel out of stock has been noted in the past week. A feature of the demand is that sizes which have not been called for in months are now on the order sheets. Prices for Philadelphia delivery are unchanged as follows:

Soft steel bars and small shapes, 2.75c.; iron bars (except bands), 2.75c.; round edge iron, 3.05c.; round edge steel, iron finish, 1½ in. x ½ in., 3.05c.; round edge steel planished, 3.80c.; tank steel plates, ¼-in. and heavier, 2.85c.; tank steel plates, 3/16-in., 3.635c.; blue annealed steel sheets, No. 10 gage, 3.65c.; light black sheets, No. 28 gage 4.25c.; galvanized sheets, No. 28 gage, 5.25c.; square twisted and deformed steel bars, 2.75c.; structural shapes, 2.85c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ⅛-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 4.20c.; squares and hexagons, cold-rolled steel, 4.70c.; steel hoops, No. 13 gage and lighter, 3.65c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.40c.; iron bands, 3.90c.; rails 2.75c.; tool steel, 8c.; Norway iron, 6.50c.; toe steel, 4.50c.

Coke.—Foundry coke is slightly firmer at $4 to $4.50, Connellsville. Apparently it is not so easy to buy at $3.75, the minimum which has been ruling. Furnace coke of good quality is obtainable at $2.75 to $3, while even as low as $2.60 has been quoted.

Old Material.—With very few transactions, the undertone of the scrap market is fairly strong. This is due principally to the belief of dealers that any important demand will send prices upward; hence they are not willing to sell anything but very small lots at the current prices. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$11.50 to $12.00
Scrap rail	11.50 to 12.00
Steel rails, rerolling	14.00 to 15.00
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels	16.00 to 17.00
No. 1 railroad wrought	14.00 to 15.00
No. 1 yard wrought	12.50 to 13.00
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	8.00 to 8.50
No. 1 busheling	11.50 to 12.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	7.50 to 8.00
Mixed borings and turnings (for blast furnace use)	7.50 to 8.00
Machine-shop turnings (for rolling mill and steel works use)	8.00 to 8.50
Heavy axle turnings (or equivalent)	8.50 to 9.00
Cast borings (for rolling mills)	9.50 to 10.00
Cast borings (for chemical plants)	No market
No. 1 cast	17.00 to 17.50
Railroad grate bars	12.50 to 13.00
Stove plate (for steel plant use)	12.00 to 12.50
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Iron car axles	No market
Steel car axles	No market

San Francisco

SAN FRANCISCO, Aug. 10.

Pig Iron.—Rather more business was reported for the past week or ten days on the Coast, but the general situation remains quiet. The most prominent inquiry was from the Southern Pacific Co., involving 300 tons of No. 1 foundry and 500 tons of No. 2. It is understood that 500 tons of Belgian material was sold at around $30, c.i.f. San Francisco. The Southern California Iron & Steel Co., Los Angeles, has placed an order for 150 tons of basic pig iron at around $31, c.i.f. San Pedro. The Puget Sound Navy Yard is asking for bids on 150 tons of foundry pig on Aug. 12. Late offerings of Belgian basic pig iron are reported at about $25 a gross ton, delivered consumers' works, which is an unusually low price. With the general curtailment of foundry operations, however, interest has not been pronounced. Business in coke has been small and principally of a routine nature.

Old Material.—This market remains almost completely dormant, and real trading is sporadic and on a small scale. Prices are nominal at around $9 a gross ton delivered for heavy melting steel and at about $20 a net ton delivered on cast iron scrap.

Cast Iron Pipe.—During the past fortnight, there is to be reported a limited business from municipal sources, and a little revival of private business, involving several hundred tons. The market has displayed another softening tendency, and the price is now ruling around $40 and even below. Douglas, Ariz., is calling bids on Aug. 12 for 30 tons of 4-in. pipe, and Sacramento is inquiring for 35 tons of 6-in. pipe. The Central Foundry Co. announces, effective here a reduction of $5 a ton on sanitary cast iron pipe.

Finished Iron and Steel.—Business is rather light the market restricted by labor troubles as well as by the prevailing depression. Steel interests can see little hope for a revival until the building trade contention is settled. Market prices continue unsettled. Considerable foreign material, largely in the form of Belgian billets and standard rails, is reported coming in and underselling domestic products by a good margin. The Southern Pacific Co. has again entered the market for materials, particularly sheets, plates and bars. From the South the Llewellyn Iron Works is inquiring for 300 tons of shapes, and another Los Angeles interest has contracted for 400 tons of bands.

Building Increases in Chicago

Building permits issued in Chicago in July showed an increase of 110 per cent in frontage covered over the same month a year ago. Permits were taken out for 754 buildings, fronting 21,403 ft. and involving a cost of $14,400,650, as against 253 permits, 9718 ft. of frontage, and $6,669,300 for July of last year. There was also a material gain over June, 1921, the permits for that month having numbered 675, covering 18,510 ft. of frontage, and involving $7,484,200. Figures for July covering the past ten years show that the frontage covered by permits issued in that month this year exceed those of all years back to 1916, and do not fall very far short of July, 1916, 1915, and 1913, and are exceeded by July, 1914, and 1912, by 10,000 and 13,000 ft. respectively. Small residences costing from $4,000 to $15,000 lead all other types of structures in the number of permits issued. The construction of a large number of apartments is also being undertaken. Permits for large office buildings and other structures involving fabricated steel are exceedingly few.

While fabricated steel tonnage bears a more or less definite ratio to the production of structural steel, the yearly percentages vary with exigencies of the time. In 1920, with the highest structural output on record, only 35 per cent of the tonnage reappeared in the fabricated reports. The usual percentage is about 45. In 1915, when structural tonnage reached an apex, the percentage reached the high figure of 61.

MEXICO BUYS LOCOMOTIVES

Places 110 with Two American Builders—Japanese Market Depressed—Venezuela Plans New Railroads

NEW YORK, Aug. 16.—Although there has come a distinctly quieter tone to the export market during the past fortnight, numerous and continued reports from various foreign markets of projects under consideration, which will involve large uses of iron and steel, pipe and machinery, give the near future an optimistic aspect. Mexico as a neighboring market is apparently becoming a safer customer for American sellers, evidenced by the recent credit of $2,000,000 for a period of three years and $500,000 in cash advanced for roadbed repairs and locomotive purchases by the Baldwin Locomotive Works. The National Railways of Mexico have placed in the United States with the two leading locomotive interests a total of 110 locomotives of various types, of which 83 are being constructed by the Baldwin Locomotive Works under the $2,000,000 credit arrangement and 27 by the American Locomotive Co. on a ten months extension of credit.

Japanese Market Dull

While buying from Japan is light and Japanese buyers are facing a declining rice and silk market as well as lower prices on iron and steel, the latter caused by the depressed situation in the United States, numerous large projects are planned throughout the Far East. German and Belgian low prices obviously are partly the underlying cause of the present cessation of purchases from Japan, as in a majority of cases, the Continental quotations are as much as 50 per cent below the American makers' price. In evidence of this, a quotation submitted recently by a Japanese branch in New York on No. 2 gage zinc sheets, used in the boxing of matches, was about $300 per ton, c.i.f. Japanese port, compared with a German price of $140 per ton, c.i f. Japan.

The recent activity in purchases of electrolytic and casting copper, most of which was either for direct shipment to China or for trans-shipment from Japan, has dropped off considerably, through the action of the Chinese Government in temporarily prohibiting shipments of copper to the Chinese mints, because of difficulties between the political factions of the North and South of China. Japan, however, is expected by some to enter the market at a later date for copper to be used for drawing into wire for the various hydro-electric projects, now planned or under construction in Japan and throughout other Far Eastern countries.

Recent Japanese orders have been confined largely to light gage black sheets and small quantities of corrugated galvanized sheets. One exporter has booked an order for 7500 packages of oil size tin plate (slightly less than 10,000 base boxes) and a total of 200 tons of No. 30 gage black sheets. An inquiry now in the hands of exporters to the Far East is from the South Manchurian Railroad and calls for a 20-ton locomotive crane. An inquiry that recently appeared in the American market from Japan, but in which but little faith is placed, calls for about 500 tons of soft steel bars, ½-in. and ¾-in. An exporter with a tonnage of about 11,000 ft. of canceled locomotive boiler tubes at Kobe, Japan, has disposed of the entire lot for 3000 yen ($1,455).

Railroads Planned in Venezuela

Among the South American nations, either planning railroads, or attempting to interest foreign capital in the construction of additional railroad lines, is Venezuela. The present rail facilities of the country consist of about 600 miles and a total investment of $40,000,000. Four new roads are being considered; one connecting a cacao region with the coast; a second through the cattle, coffee and tobacco districts; a third running from the oil country to the coast and a fourth connecting the Yuruari gold mines directly with a port and opening rich iron ore deposits.

The United Engineering & Foundry Co., Pittsburgh, has completed shipment of 9500 tons of rolling mill and steel works equipment from its Youngstown plant to England, France, India and Australia. The Youngstown units of the company have been almost exclusively engaged on this work for several months. J. J. Choorin Co., Inc., general exporters of Harbin, Manchuria and Vladivostok, has opened an office for the United States and Canada at 149 Broadway, New York. This office has been opened for the purpose of buying for the general trade in Harbin and Vladivostok and supplying the four large department stores of the company.

R. G. Dun & Co. are in receipt of an inquiry from A. Galland, 125 bis Avenue Parmentier, Paris, mine and factory supplies, requesting price lists, etc., on a pipe threading machine, motor operated, for right and left hand American threading of pipe from 4 to 10 in. A 2-kg. capacity gasoline or kerosene air compressor is also wanted. Fn. Marechal & Co., Malines, Belgium, request catalogs and prices from manufacturers of pin and rivet making machinery and stamping machines. Ateliers Armand & Deoune, 56-64 Boulevard Oddo, Marseilles, France, is interested in lathes for roughing cast iron, tempered cylinders 0.425 meter in diameter and 1.10 meters long.

REFRACTORIES MARKET

Magnesite and Chrome Brick Reduced $5 Per Net Ton—Few Changes in Other Brick

PITTSBURGH, Aug. 15.—Inquiry for refractories has improved appreciably in the past week or 10 days; and while actual business still is of rather moderate proportions, the belief is gaining ground that a turn from the extreme dullness of the past several months is at hand. Since the first of the month all manufacturers have been able to make some inroads upon their stocks, and it is confidently expected that the monthly statement of stocks on hand as of Aug. 31 will be the most favorable of any so far this year. The increase in shipments has not been accompanied by any material increase in production, and the suggestion is made in some quarters that if much steel works capacity is started up during the latter part of this year, some difficulty might attend the getting of sufficient supplies of brick. The largest sale recently reported involved 300,000 ladle brick to the Republic Iron & Steel Co. The more general policy of the steel companies is to buy as supplies are required.

Effective, Aug. 10, makers of magnesite and chrome brick have anncunced a reduction in prices of $5 per net ton. Demand for these brick is exceedingly light, and the decline in prices also may be ascribed to the desire of makers to reduce their stocks. Magnesite brick in standard sizes now are quoted at $65, which compares with $110, the peak price of last year, and $135 the high point reached during the war period. We note no special change in prices of fire clay and silica brick, but if there is a definite tendency it is down. As matters stand, there is not especially close adherence to quotations, and it is frankly admitted that there would be considerable sharpening of pencils on the appearance of a really sizable inquiry.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	$34.00 to $40.00	$28.00 to $34.00
Ohio	34.00 to 38.00	28.00 to 33.00
Kentucky	33.00 to 37.00	30.00 to 35.00
Illinois	35.00 to 40.00	30.00 to 35.00
Missouri	37.00 to 42.00	28.00 to 33.00
Silica Brick:		
Pennsylvania		33.00 to 35.00
Chicago		38.00 to 42.00
Birmingham		46.00
Magnesite Brick:		
Standard size, per net ton		65.00
Chrome Brick:		
Standard size, per net ton		52.00

British Iron and Steel Market

Improved Activity All Along the Line—Cut in Coke Prices Stimulates Business

(*By Cable*)

LONDON, ENGLAND, Aug. 16.

Coke prices are falling in all districts. Nine Cleveland furnaces are now blowing and two more are to be started immediately. Others are expected to commence operations as early as possible, for there are prospects of a resumption of steel making. Number 3 G.M.B. is still officially quoted at £6 ($21.84) for home consumption, though prices were forced up during the stoppage of iron making operations, and sellers now quote £6 15s. ($24.57) for home buyers. The export premium has been dropped.

Luxemburg basic iron is arriving, priced at £4 10s. ($16.38) delivered Tees. Belgian foundry iron is being sold here at £5 ($18.20) c.i.f. Tees. Hematite makers are well booked up ahead, and are not anxious to cut export quotations.

Steel works generally are awaiting orders, and some are reducing export prices. Home quotations are unchanged, but consumers are showing little disposition to purchase. The ship joiners' strike still continues. The Yarrow shipbuilding and engineering works are to close Nov. 30, owing to labor troubles and other causes.

There is a fair demand for Continental steel, but little business is being placed. German merchant bars are quoted at £8 5s. (1.34c. per lb.) to £8 10s. (1.38c. per lb.) f.o.b., for November shipment, which is the earliest date for which sales arrangements are now entertained. Prices made to India were £8 17½s. (1.44c. per lb.) c.i.f. German billets are held at £6 10s. ($23.66) f.o.b., for November delivery; plates at £7 15s. (1.26c. per lb.) f.o.b., for October.

Luxemburg has sold to the United Kingdom good lines of sheet bars at £6 10c. ($23.66) f.o.b. Supplies are now becoming scarce, up to £6 15s. ($24.57) f.o.b. asked. Belgium is quoting on untested plates £8 (1.30c. per lb.) f.o.b.; on tested plates, £8 10s. (1.38c. per lb.) f.o.b. French billets are held at £6 10s. ($23.66) to £6 15s. ($24.57) f.o.b.

As Welsh coal has been reduced 8s. ($1.46) and tin plate bars £1 ($3.64), tin plate prices are consequently easier. Prompt delivery is quoted at 24s. ($4.37) basis f.o.b. and November at 23s. ($4.19) basis f.o.b. There is some revival of demand from India, the Far East, South Africa and South America, and small orders are being booked. Welsh tin plate workers are becoming alarmed at the fall in prices of their product, and the prospect of further reduction of their wages, owing to the drop in the steel on which the wages are based.

India has bought a fair line of 24-gage galvanized sheets at £21 10s. (3.49c. per lb.) f.o.b. Small sales have been made to South America, particularly to the Argentine, at £22 (3.575c. per lb.) f.o.b. in cases. Straits specifications are being sold at £29 10s. (4.79c. per lb.) f.o.b. Wales is offering to Japanese specifications black sheets at £22 10s. (3.66c. per lb.) to £23 (3.74c. per lb.) f.o.b., for October shipment. Belgium is quoting £20 (3.25c. per lb.) f.o.b., for October and November shipment, on the same specifications.

We quote per gross ton except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $3.64 per £1 as follows:

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Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia	$0.35	St. Paul	$0.665
Baltimore	0.335	Omaha	0.815
New York	0.38	Omaha (pipe)	0.77
Boston	0.415	Denver	1.35
Buffalo	0.295	Denver (wire products)	1.415
Cleveland	0.24	Pacific Coast	1.665
Cincinnati	0.325	Pacific Coast, ship plates	1.335
Indianapolis	0.345	Birmingham	0.765
Chicago	0.38	Jacksonville, all rail	0.555
St. Louis	0.475	Jacksonville, rail and water	0.46
Kansas City	0.815	New Orleans	0.515
Kansas City (pipe)	0.77		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 1.80c. to 1.85c.

Wire Products

Wire nails, $2.75 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.25 and shorter than 1 in., $1.75; bright Bessemer and basic wire, $2.50 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.50; galvanized wire, $3; galvanized barbed wire, $3.40; galvanized fence staples, $3.40; painted barbed wire, $2.90; polished fence staples, $2.90; cement-coated nails, per count keg, $2.35; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70½ per cent off list for carload lots, 67 to 69½ per cent for 1000-rod lots, and 66 to 68½ per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets	$2.50
Large boiler rivets	2.60
Small rivets	70, 10 and 10 per cent off list
Small machine bolts, rolled threads	65 and 10 per cent off list
Small sizes in cut threads	75 and 10 per cent off list
Longer and larger sizes of machine bolts	75 and 10 per cent off list
Carriage bolts, ⅜ in. x 6 in.:	
Smaller and shorter, rolled threads	70 and 5 per cent off list
Cut threads	65 and 10 per cent off list
Longer and larger sizes	65 and 10 per cent off list
Lag bolts	70 and 5 per cent off list
Hot pressed sq. or hex. blank nuts	$5.25 off list
Hot pressed nuts, tapped	5.00 off list
C.p.c. and t. sq. or hex. nuts, blank	5.10 off list
C.p.c. and t. sq. or hex. nuts, tapped	4.75 off list
Stove bolts in packages	80, 10 and 10 per cent off list
Stove bolts in bulk	80, 10 and 2½ per cent off list
Track bolts	3.25c. to 3.75c. base

Square and Hex. Head Cap Screws

½ in. and under	70 per cent off list
9/16 in. to ¾ in.	70 per cent off list

Set Screws

½ in. and under	70 and 5 to 70 and 10 per cent off list
9/16 in. to ¾ in.	70 per cent off list

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size or broken kegs, 50c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $42; chain rods, $42; screw stock rods, $47; rivet and bolt rods and other rods of that character, $42; high carbon rods, $50 to $54, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, $2.75 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ⅜-in. and 7/16-in., $2.75 base; 5/16-in., $2.75 base. Boat and barge spikes, $3 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, $3.25 to $3.80 base per 100 lb. Tie plates, $2 to $2.05 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $11.30 per package; 8-lb. coating, I. C., $11.60; 15-lb. coating, I. C., $14.30; 20-lb. coating, I. C., $15.55; 25-lb. coating, I. C., $16.80; 30-lb. coating, I. C., $17.80; 35-lb. coating, I. C., $18.80; 40-lb. coating, I. C., $19.80 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.75c. from mill. Refined bar iron, 2.25c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	50½	24	⅛ to ⅜	+1½	+27½
¼ to ⅜	53½	27	½	31½	13½
½	58½	44	¾	37½	22½
¾	62½	50	1 to 1½	39½	24½
1 to 3	64½	52			

Lap Weld

2	56½	44	2	34½	20½
2½ to 6	60½	48	2½ to 6	37½	24½
7 to 12	57½	44	7 to 12	35½	22½

Butt Weld, extra strong, plain ends

⅛	46½	29	⅛ to ⅜	+9½	+42½
¼ to ⅜	49½	32	½	30½	18½
½	55½	44	¾	37½	23½
¾	60½	49	1 to 1½	39½	25½
1 to 1½	62½	51			
2 to 3	63½	52			

Lap Weld, extra strong, plain ends

2	54½	43	2	35½	22½
2½ to 4	58½	47	2½ to 4	38½	26½
4½ to 6	57½	46	4½ to 6	37½	25½
7 to 8	53½	40	7 to 8	30½	18½
9 to 12	48½	35	9 to 12	25½	13½

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2½ per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	21½	1½ in.	List
2 to 2¼ in.	36	1¾ to 1⅞ in.	10
2½ to 3 in.	47	2 to 2¼ in.	20
3¼ to 13 in.	52	2½ to 3 in.	25
		3¼ to 4½ in.	27

Standard Commercial Seamless Boiler Tubes.

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.15	Nos. 11 and 12	2.35
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.45
		Nos. 15 and 16	2.55

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.70	No. 28 (base)	3.00
Nos. 22 to 24	2.75	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30½ and 31	3.10

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Zinc	
Aug.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
10	12.00	11.75	26.87½	4.40	4.25	4.75	4.25
11	12.00	11.75	26.50	4.40	4.25	4.75	4.25
12	12.00	11.75	26.32½	4.40	4.25	4.70	4.20
13	12.00	11.75	.....	4.40	4.25	4.70	4.20
15	12.00	11.75	26.25	4.40	4.25	4.70	4.20
16	12.00	11.75	26.12½	4.40	4.25	4.70	4.20

New York

NEW YORK, Aug. 16.

The better feeling which has been manifest for the last two or three weeks continues but buying has not increased. The copper market is quiet but firm. Buying of tin has been fair at lower prices. The lead market is a little more active with the tendency higher. The zinc market shows scarcely any improvement but prices are steady.

Copper.—While buying is limited both for domestic and foreign account, it is impossible to buy electrolytic copper below 11.75c., New York, or 12c., delivered, for early delivery. At these levels some business is reported by several sellers, but most of the large producers are still out of the market except under unusual circumstances. Future delivery is not freely quoted by all sellers, but can be obtained at about 12.12½c. for September and 12.25c. for October.

Tin.—On two days last week a fair business was done in future shipment, the total sales amounting to about 350 tons. On the first day dealers were the principal buyers, but on the second consumers were fairly liberal purchasers. Thus far this week the market has been stagnant. The buying last week was due to a recession in prices, the metal being regarded as cheap at the levels reached. Spot Straits tin to-day is quoted at 26.12½c., New York. The London quotations to-day were about £8 per ton lower than a week ago, with spot standard at £154 15s., future standard at £156 and spot Straits at £155 10s. Arrivals thus far this month have been 2710 tons with 2810 tons reported afloat.

Lead.—Some sellers report the market quiet, but others state that a good business has been done in the past week, which has resulted in a firmer market. The leading interest continues its quotation unchanged at 4.40c., New York and St. Louis, but independents are asking 4.45c., New York, and 4.25c., St. Louis, at which levels they are getting some business.

Zinc.—The livelier inquiry and the better business which were reported in the first two weeks of this month seem to have disappeared and the market has turned decidedly quiet, but not necessarily weaker. Prime Western is unobtainable apparently below 4.20c., St. Louis, or 4.70c., New York, at which the current small business reported is being done.

Old Metals.—While business is not active, there is a little better tone to the market. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	11.50
Copper, heavy and wire	10.75
Copper, light and bottoms	9.00
Heavy machine composition	9.75
Brass, heavy	6.75
Brass, light	5.00
No. 1 red brass or composition turnings	7.75
No. 1 yellow rod brass turnings	4.75
Lead, heavy	3.75
Zinc	3.00
Lead, tea	3.00

Antimony.—In a quiet market prices have sagged until wholesale lots for early delivery are now obtainable at 4.50c., New York, duty paid.

Aluminum.—There is no change in the price of the leading interest for virgin metal, 98 to 99 per cent pure, in wholesale lots for early delivery which still stands at 24.50c., f.o.b. plant, but the same grade from foreign sources is available from American importers as low as 19c., New York, duty paid.

Chicago

AUG. 16.—Tin has declined in sympathy with the London market. Purchases of this metal are largely by dealers who consider it a good investment at the present price. Lead has declined slightly, while copper and spelter are unchanged. Users are buying lead and tin cautiously and in some instances are trying to buy for future delivery at lower prices. Producers are disinclined to quote on futures because every concession, no matter how slight, brings out still lower bids by users. Buyers of copper are offering less than producers will accept. The old metals are unchanged. We quote Lake copper at 12.50c. in carload lots; tin, 28.50c.; lead, 4.35c.; spelter, 4.30c.; antimony, 7.50c. On old metals we quote: Copper wire, 7c.; crucible shapes, 7c.; copper clips, 7c.; copper bottoms, 6c.; red brass, 6c.; yellow brass, 4.50c.; lead pipe, 2.50c.; zinc, 1.75c.; pewter, No. 1, 17c.; tin foil, 18c.; block tin, 20c. All buying prices for less than carload lots.

St. Louis

AUG. 16.—Demand for lead and zinc amounts to virtually nothing. The markets were never so dull as now. There is no demand for copper. The old metal markets are without interest. Lead is quoted at 4.20c. and spelter 4.20c., car lots. We quote Lake copper, car lots, at 12.73½c. to 12.98½c.; tin, 27.11c.; antimony, 5.33½c. On old metals we quote: Light brass, 3.50c.; heavy yellow brass, 5c.; heavy red brass, heavy copper and copper wire, 7.50c.; light copper, 6.50c.; block tin, 20c.; tin foil, 18c.; zinc, 2.75c.; lead, 3c.; tea lead, 2c., and aluminum, 9c.

Pittsburgh Meeting of Industrial Cost Association

At the regular monthly meeting of the Pittsburgh section of the Industrial Cost Association, held at Seventh Avenue Hotel, Pittsburgh, Aug. 10, A. A. Alles, Jr., secretary and treasurer of the national association described cost systems used by the Fawcus Machine Co., Pittsburgh. James P. McLean, Pittsburgh Forge & Iron Co., chairman of the Pittsburgh section, discussed the industrial cost lexicon or handbook, which is to be published by the national organization and will standardize industrial cost termonology. At the next meeting of the Pittsburgh section, to be held at the Seventh Avenue Hotel, Pittsburgh, Sept. 14, Jay Chapin, assistant secretary of James H. Matthews Co., Pittsburgh, will describe the cost system of the Matthews company.

Tinplate Exports from Liverpool

Consular reports show in the following table the quantity in gross tons, and countries of destination, of the tinplates and tinned sheets exported from Liverpool in 1919 and 1920:

Countries of Destination	1919 Tons	1920 Tons	Countries of Destination	1919 Tons	1920 Tons
France	34,357	60,526	Germany	309	1,874
B. East Indies	33,760	51,579	Russia	1,303	1,504
Australia	36,023	47,338	Argentina	5,701	1,148
Netherlands	16,032	21,598	Rumania	2,574	1,004
Portugal	17,452	18,585	Canada	500	957
China	7,535	17,118	United States	254	625
Belgium	8,761	17,032	All other countries	85,449	73,359
Italy	6,056	16,073			
Norway	20,164	12,761			
Japan	13,222	9,958	Total	289,462	353,017

The total value of the tinplate and tinned-sheet exports in 1919 was $53,914,317 and $92,240,682 in 1920.

METAL SCHEDULE NEXT WEEK

Steel Interests Oppose Ferro Alloy Duties—Agreement Reached on American Valuation

WASHINGTON, Aug. 16.—Hearings before the Senate Committee on Finance on the metal schedule of the permanent tariff bill probably will not begin until next week. It had been hoped to reach them this week, but so many witnesses asked to be heard on the chemical and the earths, earthenware and glassware schedules, the two which precede the metal schedule, that this idea had to be abandoned. Efforts to expedite the hearings in order to prepare the bill for reporting have not been as successful as could be wished. Under a rule adopted by the committee each witness is allowed 15 minutes except where the subject under discussion is considered to be important enough to justify more time. The latter situation already has developed in a number of cases on the chemical schedule, hearings on which began yesterday.

The first witness to be heard on the metal schedule will be Chairman John A. Topping of the Republic Iron & Steel Co., who was in Washington yesterday. He will act as spokesman for the indepedent iron and steel interests of the country, covering the entire schedule. It is known that part of his testimony will be directed against the rates of duties carried in the ferroalloy section, which has been the object of attack from many consumers. Vigorous efforts will be made to induce the committee to revise the section sharply downward, and in the case of some items, such as manganese ore, the request will be made for restoration to the free list. Mr. Topping, in addition to speaking on the metal schedule as it was passed by the House, will ask that raw materials used by the iron and steel trade be incorporated in the metal schedule, where duties are to apply, instead of being included in other schedules, as some of them are in the House bill. Among such items are magnesite, which was placed in the chemical schedule, and fluorspar, included in the earths, earthenware and glassware schedule. Refractory brick, limestone and graphite, used by steel works and foundry interests, are also carried in the earths schedule. It is pointed out that items of this character are so closely related to the iron, steel and foundry trades that logically they should be placed, when on the dutiable list, in the metal schedule. Names of witnesses other than Mr. Topping who are to appear before the committee in connection with the metal schedule hearings have not been given out, but it is understood that there will be a full presentation of views on the subject and that some of those to be heard will require more than 15 minutes to give their testimony. Plans have been made so that men of the trade specializing in certain products will speak on these lines.

There will be both opposing and supporting views with regard to rates in the metal schedule, and it is stated that domestic producers of manganese and other ores and ferroalloys will contend for the House bill rates as strongly as they are combatted. There will be a contest also, it is stated, over crucible steel products, some opposition having developed to the rates in the pending bill.

American Valuation Agreed Upon

Over and above the rates carried in the tariff bill, the steel trade is showing interest in the administrative features, which as adopted by the House have been quite acceptable to manufacturers. The American valuation plan has been favored by iron and steel interests, and they are satisfied with the compromise made on it last week between majority members of the Senate Committee on Finance and the House Committee on Ways and Means, which gives a rather definite promise that it will be enacted into law as agreed upon by the Senate and members of the two committees. This being the basis on which ad valorem rates are to be assessed, it was considered necessary by the majority members of the Finance Committee to arrive at an understanding regarding it before proceeding with hearings on the schedules. The subject brought out spirited contentions from witnesses before both committees.

Methods of Assessment

Chairman Fordney of the Committee on Ways and Means said that even with the changes made in the American valuation plan, which are relatively mild, a distinct victory had been won for the proposal. The changes were decided upon after conference between members of the Finance Committee and Treasury experts. It is claimed by the Senators that the changes will make the valuation plan more workable and less likely to result in litigation. Under the revised provision, ad valorem rates will be assessed on the basis of the American wholesale selling price on all imports, where comparable and competitive articles of domestic manufacture are found. Where no comparable and competitive articles exist, the duty will be assessed on the American wholesale selling price of a comparable and competitive imported commodity. In the event no such basis prevails, then the duty will be levied on the value of the articles in the country of origin at the time of export, plus necessary transportation and other expenses to an American port and a reasonable profit, totaling not less than 16 per cent of the value of the articles. If no basis is found in the first three alternatives, the plan of assessment will be to revert to the production cost, plus the expense of laying the shipments down in America. It has been stated that the provision as finally agreed upon would apply to about 75 per cent of all imports. In the case of iron and steel there will be few if any instances where the ad valorem duties cannot be based on comparable and competitive products. One of the important advantages the plan gives to domestic iron and steel makers, it has been stated, is on products carrying extras. Importations when coming under the classification of extras will be made dutiable, not on the base prices, but on the latter plus the extras.

With the American valuation plan adopted and with the anti-dumping act in effect, some American makers of steel believe there need be no cause for alarm over competition with German steel. Mr. Topping is among those who share this view.

Graphitization in Cast Iron

Microscopic study of graphitization in cast iron has been further studied by the Bureau of Standards, Washington. The investigation supplements that reported in technologic paper No. 129. After prolonged annealing considerable graphitization, that is, change in the combined carbon, occurs in the material below the thermal critical range (approximately 700 deg. C.). Below 500 deg. C., however, no change was detected even after a very prolonged heating period. In the low-temperature graphitization, only the pearlite is affected; the free carbide does not appear to be changed until the thermal critical point has been passed and solution of this constituent has begun. The form in which the graphite exists after annealing depends upon initial structural state of the iron. If any flakes of graphite exist, they act as nuclei for the deposition of the graphite formed during annealing; if no such flakes are present, the new graphite takes the form of small globules rather than flakes.

The experimental work of this investigation, furnace work, chemical analyses, microscopic examination, has now been completed and the data are being put in shape for publication.

GERMAN PRICES HARDENING

Industrial Problems as Affected by Taxation at Home and Tariff Walls Abroad

(By Air Mail Express to London)

BERLIN, GERMANY, Aug. 1.

The past month has witnessed a hardening of most commodity prices and indications are not lacking that the increase in living costs—which will become more pronounced as autumn approaches and the proposed new taxes will come into force—will start a fresh period of wage claims. The recent price advance for certain grades of coal by the Rhenish-Westphalian Coal Syndicate has automatically brought about an increase in cement prices, which in turn are reacting upon the building trades, and the planned increase in potash prices will doubtlessly result in dearer agricultural product. One gains the impression that official circles are by no means wholly averse to the idea of sanctioning higher prices to agriculture, industry and trade, with a view to increasing public revenues by increasing the taxability of the three groups to the possible maximum. Whether the taxation dilemma can be solved without further inflation remains to be seen. Inflation and watering of capital stock are going hand in hand.

More Amalgamations

Plant extensions and formation of new combines or mergers are being announced almost daily. The Ottensener Eisenwerk Aktien Gesellschaft at Ottensen-Altona (near Hamburg) is negotiating with the Hamburg authorities for a site measuring 71,800 sq. yd. and located in the old petroleum harbor in Hamburg, where a ship's boiler plant is to be erected. One of the larger mining concerns, the Ilseder Hütte, is conducting iron ore mining operations in the Goslar district (Central Germany), where a new shaft is being sunk near Haverlahwiese. The Gelsenkirchner Bergwerks Aktien Gesellschaft is likewise showing activity in pushing mining operations. It is also announced that the idle pits at Wettin and Löbejün, owned by the State, will shortly be reopened and operated by the company.

Under the name of "Gesellschaft Aluminium Thermie—Professor Dr. H. Goldschmidt," a new company has been established by the inventor of the thermit patent, Dr. Hans Goldschmidt, in co-operation with the Mark steel works at Wengern-on-the-Ruhr. The company will primarily engage in welding operations, particularly rail welding on the road, as well as in the production of metals and alloys, both by the aluminum-thermit process and other new patented processes.

The tendency of merging of interests has been forming a feature in the metal working fields. The Deutsche Maschinenfabrik (Demag) at Duisburg has expanded. Interest is focussed on the Maschinenbauanstalt Humboldt at Cologne. There has lately been some heavy buying in Humboldt shares by a group believed to be connected with the Klöckner concern, while a foreign group is likewise reported to evince a strong interest in the shares of that company. The same parties are also stated to have their eyes on the Flander machine works.

Obstacles to Export Business

In the iron industry, the activity at wire mills, construction shops and rail mills deserves mention. Less satisfactory conditions appear to obtain in the Remscheid and Solingen tool and cutlery industry, where the lag in sales is largely accounted for by the severe customs restrictions by Spain, Italy, Norway and Canada. The Bergische Chamber of Commerce has petitioned the Government to intervene at the Spanish and Italian Governments with a view to having the customs rates on small iron ware reduced in order to avoid hardships to the industry.

The overseas market seems to be somewhat slow in developing but your correspondent learns from an authentic source that trade in hardware and small iron and steel ware with China has been gaining in volume at a marked rate since the conclusion of the commercial treaty between China and Germany. Inquiries for fairly large shipments are being received and substantial orders have already been closed. Most of the business is being done by firms who were catering to the Chinese market before the war. The enamel ware industry is showing activity in working the South American market, where, according to a prominent Saxon firm, kitchen ware is meeting with a good demand.

A leading Hanover works has just entered an order by the Dutch State Railroads for 2000 cars and 100 coaches. Krupp's are known to have sent a representative to Riga, who was received by the ministers of traffic and finances and apparently is testing the market for rolling stock, motors, agricultural machinery, etc. Bulgaria is in the market for railroad material and mining equipment. The purchasing commission of the Bulgarian State Railroads has established an office at Berlin and so has a mission representing the State mines at Pernik.

Quotations are as follows, per metric ton with the mark at 1.24c.:

	Marks	
Billets	1550–1580	$19.22 to $19.59
Sheet bars	1530–1580	18.97 to 19.59
Blooms	1400	17.36
Ingots	1300	16.12
Bar iron	1900–2000	23.56 to 24.80
Structural shapes	1800–2100	22.32 to 26.04
Squares	2100–2200	26.04 to 27.28
Concrete bars	1850–1950	22.94 to 24.18
Rounds, drawn	2600	32.24
Hoop iron, cold rolled, annealed	3400	42.16
Rails, standard sections	2350–2400	29.14 to 29.76
Wire rods	2000	24.80
Sheets, heavy	1750–1850	21.70 to 22.94
Sheets, medium	1850–1950	22.94 to 24.18
Plates, light	2200–2300	27.28 to 28.52
Sheets for stamping, double plan	3900–4200	48.36 to 52.08
Steel pipe, welded, per meter	3.50	.04

Increased Activity in Mahoning Valley

YOUNGSTOWN, OHIO, Aug. 16.—Maintenance of finished steel production around 50 per cent of capacity, a substantial increase over a month ago when it averaged 25 per cent or less, is one of the encouraging features of the industry in the Mahoning Valley.

Of the 105 sheet mills in the Valley, 54 are under power. Following a long suspension, the Mahoning Valley Steel Co. started five of its eight mills on Monday. The Falcon Steel Co., which has been idle for two months, is also preparing to resume.

Independent steel making units are operating at fully 50 per cent, while similar units of the Carnegie Steel Co. are engaged to the extent of 40 per cent. At Girard, the A. M. Byers Co. is operating 22 puddle furnaces in No. 1 puddle mill, and one bar mill. The full strip capacity of the Trumbull Steel Co. is active, largely on orders from the Ford Motor Co. Nine of the 17 tube mills in this district are in commission, while only one plate mill is rolling, the 84-in. mill of the Brier Hill Steel Co. Sharon Steel Hoop Co. reports considerable enlargement in production of sheet steel, operating seven mills.

Comparative figures for July and August on railroads serving the Youngstown district show an increase in the movement of freight during the first 12 days of this month. The New York Central, Erie, Pennsylvania and Baltimore & Ohio report increased movements of loaded cars since the beginning of August. The Ohio region of the Erie reports an increase in the daily movement of loaded cars of 349 since Aug. 1, as compared with July. The increase in short-haul movements averages nearly 150 cars a day. Railroad officials say there has been a sharp increase in the movement of semi-finished steel.

Mattie blast furnace, at Girard, Ohio, of the A. M. Byers Co., Pittsburgh, is being overhauled and repaired preparatory to having the blast turned on.

Ore piles are rapidly being built up at the new furnace at Warren, Ohio, built by the Trumbull-Cliffs Furnace Co. for the Trumbull Steel Co., and it is expected this 600-ton stack will be started for the first time in the fall.

Because of its abundant ore stocks, the Brier Hill Steel Co., Youngstown, is preparing to dock its lake steamer, the H. H. Porter, at the end of August, much earlier than usual.

United States Pig Iron Production in the First Half of 1921

The American Iron and Steel Institute in its special statistical bulletin No. 4 gives the production of all kinds of pig iron in this country for the first six months of the present year. Aside from the showing that output was barely one-half of the production of either half of 1920, outstanding features are the small amount of iron made with the use of anthracite coal or anthracite mixed with coke, and the drop in the amount of charcoal pig iron made.

Anthracite iron is less than 1/7 per cent of the total production, lower by a wider margin than ever before, though the tendency has of course been downward. Charcoal iron for this year is less than ¾ per cent of the total.

HALF-YEARLY OUTPUT OF PIG IRON BY STATES.

HALF-YEARLY PRODUCTION OF ALL KINDS OF PIG IRON.

States.	Blast furnaces. In blast Dec. 31 1920.	June 30, 1921. In.	Out.	Total	Production—Gross tons. (Includes spiegeleisen, ferro-mang., ferro-silicon, ferro-phosphorus, etc.) First half of 1920.	Second half of 1920.	First half of 1921.
Maine	0	0	0	0			
Massachusetts	1	0	1	1	6,180	4,101	1,537
Connecticut	0	0	2	2			
New York	16	3	24	27	1,207,475	1,393 659	506,113
New Jersey	1	1	3	4			
Pennsylvania	73	27	134	161	7 241,726	6,741,408	3,577,570
Maryland	2	1	6	7	254,420	269,313	75,130
Virginia	4	2	15	17	223,522	205,780	53,519
Alabama	15	8	35	43	1,225,236	1,167,726	659,225
Georgia	0	0	4	4			
Texas	0	0	1	1			
West Virginia	3	1	4	5	374,906	397,473	117,215
Kentucky	0	0	7	7			
Mississippi	0	0	1	1			
Tennessee	3	0	17	17	159,041	124,166	12,369
Ohio	49	14	66	80	4,130,811	4,402,659	2,081,847
Illinois	16	6	20	26	1,634,164	1,646,711	1,030,801
Indiana	12	7	9	16	1,426,045	1,513 476	1,019 010
Michigan	10	2	11	13			
Wisconsin	3	1	6	7	345,091	366,314	211,574
Minnesota	2	0	3	3			
Missouri	3	1	3	4			
Iowa	0	0	0	0			
Montana	0	0	0	0			
Colorado	3	2	3	5	206,985	257,599	185,071
Oregon	0	0	1	1			
Washington	0	0	0	0			
Total	216	76	376	452	18,435,602	18,490,385	9,530,981

HALF-YEARLY PRODUCTION OF COKE PIG IRON.*

Maine	0	0	0	0			
New York	16	3	23	26	1,211,475	1,393 659	507,108
New Jersey	1	1	3	4			
Pennsylvania	71	27	120	147	7,094,917	6,585,086	3,564,406
Maryland	2	1	5	6	254,420	269,313	75,130
Virginia	4	2	15	17			
Georgia	0	0	2	2	223,522	205,780	53,519
Texas	0	0	1	1			
Alabama	14	8	32	40	1,212,718	1,154,404	655,693
West Virginia	3	1	4	5			
Kentucky	0	0	7	7	374,906	397,473	117,215
Tennessee	3	0	14	14	155,897	115,104	12,369
Ohio	49	14	66	80	4,130,811	4,402,659	2,081,847
Illinois	16	6	20	26	1,634,164	1,646,711	1,030,801
Indiana	12	7	9	16			
Michigan	2	1	3	4	1,502,165	1,558,526	1,060,523
Wisconsin	2	1	5	6			
Minnesota	2	0	3	3			
Missouri	1	0	1	1			
Iowa	0	0	0	0			
Montana	0	0	0	0			
Colorado	3	2	3	5	338,616	437,698	289,612
Washington	0	0	0	0			
Oregon	0	0	1	1			
Total	201	74	337	411	18,133,611	18,166,413	9,448,223

*Includes ferro-alloys made with electricity, electricity and coke, etc.

HALF-YEARLY PRODUCTION OF ANTHRACITE AND MIXED ANTHRACITE AND COKE PIG IRON.

Pennsylvania	2	0	10	10	146,379	156,188	12,823
Total	2	0	10	10	146.379	156,188	12,823

HALF-YEARLY PRODUCTION OF CHARCOAL PIG IRON.

Massachusetts	1	0	1	1			
Connecticut	0	0	2	2	2,610	4,235	883
New York	0	0	1	1			
Pennsylvania	0	0	4	4			
Maryland	0	0	1	1			
Alabama	1	0	3	3			
Georgia	0	0	2	2	15,662	22,384	3,532
Tennessee	0	0	3	3			
Mississippi	0	0	1	1			
Michigan	8	1	8	9	92,382	113,141	41,346
Wisconsin	1	0	1	1			
Missouri	2	1	2	3	44,958	28,024	24,174
Total	13	2	29	31	155,612	167,784	69,935

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Coke*	201	74	337	411	18,133,611	18,166,413	9,448,223
Anthracite†	2	0	10	10	146,379	156,188	12,823
Charcoal	13	2	29	31	155,612	167,784	69,935
Total	216	76	376	452	18,435,602	18,490,385	9,530,981

* Includes ferro-alloys made with electricity, electricity and coke, etc.
† Includes mixed anthracite and coke pig iron.

HALF-YEARLY OUTPUT OF PIG IRON BY GRADES.

HALF-YEARLY PRODUCTION OF BASIC PIG IRON.

States.	First half of 1920.	Second half of 1920.	First half of 1921.
New York, New Jersey	513,327	623,977	199,568
Pennsylvania—Allegheny County	1,646,540	1,498,988	1,024,302
Other counties	2,180,007	1,970,770	736,305
West Virginia, Alabama, Kentucky	691,574	707,124	438,730
Ohio	1,442,867	1,505,444	685,788
Indiana, Illinois	1,754,977	1,699,669	1,149,432
Michigan, Minnesota, Missouri, Colorado	221,402	281,106	270,306
Total	8,450,694	8,287,028	4,504,431

HALF-YEARLY PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS PIG IRON.

New York	193,096	181,992	61,225
Pennsylvania	2,523,457	2,432,309	1,381,591
Maryland	247,070	274,663	74,660
West Virginia, Kentucky, Tennessee, Alabama	193,426	218,097	73,816
Ohio	1,899,250	2,079,537	1,081,868
Illinois, Colorado	862,225	956,962	606,912
Total	5,918,524	6,143,560	*3,280,072

* Includes 62,908 tons of low-phosphorus pig iron.

HALF-YEARLY PRODUCTION OF FOUNDRY PIG IRON AND FERRO-SILICON.

Maine, Massachusetts, Connecticut	6,173	4,062	1,537
New York, New Jersey	398,765	456,003	215,512
Pennsylvania	539,707	531,667	285,798
Maryland, Virginia, West Virginia	236,597	200,405	
Kentucky	42,601	29,378	67,138
Tennessee	136,692	103,942	
Alabama	644,494	582,360	241,091
Ohio	488,448	528,463	219,004
Indiana, Illinois	107,572	83,876	104,944
Michigan	170,099	249,587	118,110
Wisconsin	171,416	163,736	85,800
Missouri, Iowa, Colorado, Washington	37,637	44,102	36,465
Total	2,980,201	2,977,581	*1,375,399

* Includes 55,180 tons of ferro-silicon.

HALF-YEARLY PRODUCTION OF MALLEABLE PIG IRON.

New York	90,320	114,168	22,533
Pennsylvania	68,880	40,820	14,099
Kentucky, Ohio	245,221	210,993	62,267
Indiana, Illinois, Michigan, Wisconsin, Minn	261,744	278,805	66,623
Total	666,165	644,786	165,522

HALF-YEARLY PRODUCTION OF FORGE PIG IRON.

New Jersey, Pennsylvania	104,818	70,985	13,280
Virginia, Tennessee	2,366	710	
Alabama	9,441	8,258	5,276
Ohio	52,244	69,226	30,381
Total	168,869	149,179	48,937

HALF-YEARLY PRODUCTION OF SPIEGELEISEN AND FERRO-MANGANESE.

New York, Pennsylvania	170,706	191,670	122,093
Virginia, Alabama, Tennessee	4,287	12,602	9,646
Illinois, Colorado, Montana, Washington	11,968	15,663	4,530
Total	186,961	219,935	*136,269

* Includes 83,861 tons of ferro-manganese and 52,408 tons of spiegeleisen.

HALF-YEARLY PRODUCTION OF OTHER GRADES.

Connecticut, New York, New Jersey	7,984	8,478	4,482
Pennsylvania	11,601	13,329	2,895
Maryland, Va., West Va., Ky., Tenn., Alabama	21,587	26,923	7,101
Ohio	9,771	8,992	2,539
Indiana, Illinois, Michigan, Wisconsin, Missouri, Colorado	13,245	10,594	3,334
Total	64,188	68,316	20,351

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS IN THE FIRST HALF OF 1921.

Grades.	For sale.	For maker's use.	Total. Gross tons.
Basic	361,884	4,142,547	4,504,431
Bessemer and low-phosphorus	263,964	3,016,108	3,280,072
Foundry, including ferro-silicon	1,211,014	164,385	1,375,399
Malleable	132,673	32,849	165,522
Forge or mill	20,291	28,646	48,937
Ferro-manganese	22,797	61,064	83,861
Spiegeleisen	5,745	46,663	52,408
All other grades	10,314	10,037	20,351
Total	2,028,682	7,502,299	9,530,981

PERSONAL

E. Dana Durand has been appointed chief of the newly created eastern European division of the Bureau of Foreign and Domestic Commerce. Mr. Durand was director of the Bureau of the Census from 1909 to 1913 and from 1903 to 1909 was connected with the Bureau of Corporations of the Department of Commerce and Labor, first as economic expert and later as deputy commissioner. As an instructor in economics he has served at Harvard, Stanford and Minnesota universities. He is author of "The Finances of New York City," "The Trust Problem," and numerous magazine articles and Government reports.

G. St. J. Perrott, associate physical chemist of the Bureau of Mines experiment station, Pittsburgh, will go to Birmingham, Ala., to study the physical properties of coke in relation to its production and use in the blast furnace. Conditions are favorable for conducting these investigations at the Tuscaloosa experiment station of the Bureau of Mines, with the co-operation of a number of companies operating blast furnaces and by-product plants in Alabama.

R. A. Lundquist, Minneapolis, has been appointed head of the newly created electrical machinery division in the Bureau of Foreign and Domestic Commerce, Department of Commerce. He is a graduate of the University of Minnesota. He has made extensive studies of the possibilities for the sale of American electrical goods and machinery in Australia, New Zealand, China, Japan and South Africa, the results of which have been published by the Bureau. He is author of "Transmission Line Construction-Methods and Cost" (McGraw-Hill Publishing Co.) and various articles for engineering and other technical journals. Like heads of other divisions already set up in the Bureau, including iron and steel, lumber and heavy machinery, Mr. Lundquist will specialize on work looking to the expansion of foreign markets for American interests.

C. R. White, for many years connected with the New York office of Alfred Herbert, Ltd., British machine-tool manufacturer, as assistant manager, is no longer associated with that company.

Fred C. Severih, for the past few years manager of the New York office of the Betts Machine Co. of Rochester, N. Y., and before that with the Niles-Bement-Pond Co., has resigned. The Betts Machine Co. has not yet appointed his successor.

Walter G. Bunzel, formerly chief engineer of the Richmond Radiator Co., is now associated with the Pittsburgh Electric Furnace Co. at its New York office, 149 Broadway.

T. A. O'Leary Co., Keenan Building, Pittsburgh, effective Aug. 6, relinquished the representation in the Pittsburgh district of the Farber Fire Brick Co., St. Louis, and hereafter will devote its attention to Pennsylvania fire clay brick as sales agent for the Climax Fire Brick Co., Climax, Pa.

Carl A. Johnson, president Gisholt Machine Co., Madison, Wis., was elected a director at the formal organization meeting of stockholders in the Northwestern Casualty & Surety Co., Milwaukee, which was incorporated some time ago with a capital stock of $1,000,000 and a surplus of $750,000. Other directors elected include: K. K. Knapp, general counsel Illinois Steel Co., Chicago; Norval A. Hawkins, sales director General Motors Corporation, Detroit.

H. M. Schwartze, for 15 years electrical engineer for the Cadillac Motor Car Co., Detroit, has resigned to join the engineering staff of the new Collins Motor Car Co.

E. W. Seaholm, for several years assistant, has been appointed chief engineer of the Cadillac Motor Car Co. Detroit.

J. C. Ward, director Edgar Allen & Co., Ltd., Sheffield, England, left on Aug. 13 on the Aquitania for a visit to the New York and Chicago offices of the Edgar Allen Steel Co., Inc., manufacturer of high speed, carbon and alloy tool steels.

J. Leonard Replogle, chairman Replogle Steel Co., and president Vanadium Corporation of America, recently returned from a trip to Europe, where he has been studying business conditions.

Ralph C. Schwarz has taken over the Northwestern New York territory for the distribution and sale of Stewart industrial furnaces and appliances. His address will be 921 Granite Building, Rochester, N. Y.

James H. Nutt, 306 Mahoning Bank Building, Youngstown, Ohio, secretary of the Western Bar Iron Association and the Western Sheet & Tinplate Manufacturers' Association, has recently added to the records of the office three bound volumes containing copies of the annual wage agreements with the Amalgamated Association of Iron, Steel and Tin Workers since 1881. The sole purpose of the two manufacturers' organizations is to deal with employees at the annual conferences and at the bi-monthly settlements. Mr. Nutt has been secretary since 1892, when the association embraced but a few members. The Amalgamated Association was formed in 1876. For many years Mr. Nutt served as a puddler in the mills.

Samuel M. Vauclain, president Baldwin Locomotive Works, Philadelphia, inspected the plant of the St. Louis Coke & Chemical Co. at Granite City, Ill., on Aug. 13, stopping on his return to Philadelphia from a trip to Mexico. He was met in St. Louis by Clarence H. Howard, president Commonwealth Steel Co., St. Louis, and William B. Dickson, vice-president Midvale Steel & Ordnance Co., New York.

Lyman M. Waite, formerly with the National Acme Co. and recently with the Springfield Automatic Screw Machine Corporation, Fitchburg, Mass., has been appointed sales manager of the Garvin Machine Co., New York, succeeding Frank A. Power, who has resigned.

Mason B. McLaughlin, manager of the central sales department, Cleveland, of the White Co., has been elected a vice-president, as has also Robert W. Woodruff, manager of the southeastern sales department with headquarters at Atlanta Ga.

Horton Penrose, for a number of years Pittsburgh and Philadelphia representative of Shimer & Co., has become connected with the Cleveland-Cliffs Iron Co., Cleveland, as a salesman in the pig iron department.

C. T. Stewart, Harbison-Walker Refractories Co., Pittsburgh, and R. T. Blair, Pittsburgh Gage & Supply Co., Pittsburgh, have been chosen delegates of the Purchasing Agents' Association of Pittsburgh to the national convention of the Purchasing Agents' Association of the United States, to be held in Indianapolis, Oct. 13 to 15, inclusive.

W. S. Pilling of the pig iron firm of Pilling & Co., Philadelphia, sailed on Saturday, Aug. 13, for England. He will be gone several weeks.

The recent reduction in prices of shovels, spades and scoops of $3.40 per dozen by Hubbard & Co., Pittsburgh, has been followed, in part, by other large manufacturers who have announced a cut of $3 per dozen, effective Aug. 15. The new quotations now quoted by the Ames Shovel & Tool Co., Boston, the Baldwin Tool Co., Parkersburg, W. Va., the Pittsburgh Shovel Co., Pittsburgh, the Wood Shovel & Tool Co., Piqua, Ohio, follow: Black, first grade, $10.14; per doz., second grade, $9.40; third grade, $8.75; fourth grade, $7.90, to which must be added $1 per doz. for polishing.

Working forces in factories in New York State have fallen approximately 30 per cent since March, 1920, according to a report of the State Industrial Commission. This represents a reduction of about 450,000 workers. The metal industries are reported to have sustained the largest recent losses. Lack of orders is the main reason for curtailment.

OBITUARY

AUGUST A. FRAUENHEIM, president of the Iron City Sanitary Mfg. Co., Pittsburgh, died at his country home, Kittanning pike, O'Hara Township, Pa., Aug. 10. He was prominently connected with the business and industrial life of Pittsburgh. For a number of years he was president of the Epping-Carpenter Pump Co., serving in that capacity until the concern merged with the Worthington Pump & Machinery Corporation. He was a director of the Pennsylvania National Bank, the East Williston Land Co., New York and the Pittsburgh Hospital. He was a member of the Duquesne Club, the Pittsburgh Country Club and the Pittsburgh Athletic Association in Pittsburgh.

JOHN A. HANLON, vice-president and general manager of the Hanlon-Gregory Galvanizing Co., Pittsburgh, died suddenly in his home in that city, Aug. 11. Mr. Hanlon, who was 41 years old, was born in Pittsburgh, and had been active in the galvanizing industry for the past 15 years. Prior to 1913 when the Hanlon-Gregory company was organized, he had been affiliated with the Pittsburgh Galvanizing Co. He was a member of the National Galvanizers Association, serving several terms as president of that organization.

WILLIAM H. GRIFFITHS, 67 years old, president of the Griffiths Charcoal Iron Mills, Washington, Pa., died at his home there Aug. 12. He was born in Boston, England, coming to this country when a boy of 17 years, and locating in Pittsburgh. He went to Washington, Pa., in 1895 and established the first tin plate plant in that district.

THOMAS W. HOLMES, 27 years old, superintendent of the Twenty-fifth Street plant, Pittsburgh, Railway Steel Spring Co., died in Erie, Pa., Aug. 11, following a brief illness. He was born in Pittsburgh and had been affiliated with the Railway Steel Spring Co. for the past 12 years.

JULIAN BURDICK, president of the West Penn Steel Co., Pittsburgh, has the sympathy of his friends in the sudden death of his son, Julian Burdick, Jr., aged 13 years, who was killed Aug. 9, as the result of a fall from a cliff at Eaton's Ranch, Wyo., where the family of Mr. Burdick had been summering.

FREDERICK ERDLE, founder of the Erdle Perforating Co., perforated metals, Rochester, N. Y., died at his home in that city on Aug. 2 at the age of 81 years. He retired 12 years ago from active participation in the business.

CHARLES HAINES WILLIAMS, first vice-president Chicago Railway Equipment Co., Chicago, died at his home in that city on Aug. 8, aged 46.

The production of by-product coke in the United States in July showed a decrease of 8.9 per cent, when compared with that for June. The total output was 1,285,000 tons as against 1,410,000 tons, the revised figure for June. These statistics, issued by the Geological Survey, show that the July production was 35 per cent of the maximum capacity of the ovens. Fifty-five plants were in operation and 15 were idle. The output of beehive coke during July was only 181,000 tons.

A. M. Castle & Co., jobbers in iron and steel, Chicago, have commenced the construction of a new warehouse at the northwest corner of Blackhawk and North Branch streets. It will be 211 x 232 ft. and will cost $350,000. The west 75 ft. is to be two stories in height and the second floor will be used for the general offices of the company, giving a floor area for that purpose of 72 x 211 ft.

Railroad track abandoned in the United States during 1917, 1918, 1919 and 1920 exceeded the new mileage built by more than 1000 miles. Abandonment has averaged more than 1000 miles annually for some years.

Office and Trade Changes

Altemus & Prindle, room 5726, Grand Central Terminal, New York, have been appointed exclusive selling agents in the United States for the Compagnie Belge des Mines, Minerais et Metaux, Antwerp, Belgium, a mining and smelting concern. They are now in position to offer in this market phosphoric and non-phosphoric Swedish iron ores, Barreiro iron ore, Douaria, Rif and Rubios iron ore, Indian manganese and chrome ores, and alloys such as standard 80 per cent ferromanganese, silicomanganese, ferrosilicon, ferrochrome and pyrites. C. L. Altemus and H. B. Prindle, who established themselves in the iron and steel business some time ago, with quarters at 101 Park Avenue, New York, recently moved to the Grand Central Terminal.

O. J. Abell & Co., 29 South La Salle Street, Chicago, has added to its existing lines in the machinery and machine products field representation of the Jefferson Forge Products Co., Detroit, maker of automotive forgings and the Jefferson one-piece drop-forged steel wheel; and the Pittsburgh Electric Furnace Corporation, Pittsburgh, builder of the Moore 'Lectromelt furnace for the manufacture of electric steel, malleable and gray iron.

The Metals Coating Co. of America, manufacturer and distributor of the Schoop metal spraying process, by which metallic coatings may be sprayed upon any surface, is now in full operation at its new plant, 495-497 North Third Street, Philadelphia, having removed from its former Boston, Mass. and Woonsocket, R. I. locations.

The New York office of the Matthew-Addy Co., has been moved to 90 West Street.

The name of the Kendall Hardware Co., 421 Main Street, Cambridge, Mass., has been changed to the Kendall Nail & Hardware Co. Peter C. Welch is president and John B. Welch, treasurer.

The Eastern Steel Co. announces the discontinuance of its Boston office. Harry O. Russ will continue to represent the company in that territory with headquarters in the New York office, 50 East Forty-second Street.

The Boston office of the Eastern Steel Co. has been discontinued, effective Aug. 10. Harry O. Russ, who has been New England sales agent since 1907, will continue to represent the company in that territory, with headquarters in the New York office, 50 East Forty-second Street.

T. J. Rafferty & Co., iron and steel scrap and steel, Worcester, Mass., have removed their offices from the Park Building, to their new warehouse at 21-23 Ellsworth Street. With the erection of three new buildings, a full line of hot and cold rolled strip steel, cold rolled shafting and screw stock, tool steel, machine steel, etc. will be stocked.

Medley Scovil Co., New York advertising firm, have moved to new and larger offices in the new Cunard Building, 25 Broadway.

The Schaffer Engineering & Equipment Co., Pittsburgh, has combined its administrative, sales and manufacturing departments in its new general offices at 2828 Smallman Street, Pittsburgh.

Earle S. Barber, who recently resigned as director and sales advertising manager of Alfred Decker & Cohn, Chicago, has engaged in business as Earle S. Barber & Co., commercial councillors, with offices in the new Wrigley Building. They will cover the various branches of business and will maintain a sales organization for obtaining distribution and maintaining efficient representation in five states—Illinois, Indiana, Iowa, Michigan and Wisconsin.

The Cincinnati office of the Cutler-Hammer Mfg. Co., Milwaukee, has been removed from the Gwynne Building, to the Dixie Terminal Building. A. R. Maujer, formerly of the sales-engineering force of the Pittsburgh office, is now in charge of the Cincinnati office.

The Eastern Agencies Co., manufacturers' representative, 79 Main Street, Yokohama, Japan, opened an office on July 15 in Tokio in charge of Edwin Russell, at 3 Uchisaiwai-cho, Itchome Kojimachi-ku. The company represents the Steel Producers Export Corporation, New York, and the Western Clock Co., La Salle, Ill., among others.

The Societe Anonyme des Usines Giulini, Basel, Switzerland, manufacturer of virgin aluminum ingots, notched bars, bars, plates and sheets, have appointed C. W. Leavitt & Co., New York, sole selling agents for the United States and Canada.

Record of many months of decreasing index figures for the cost of living has been broken by July, which recorded a slight advance. Metals, foods and farm products are the lowest of all groups studied, while furniture and building materials are highest. The average is now about 50 per cent above 1913.

IRON AND INDUSTRIAL STOCKS

Lower Prices Have Ruled Much of the Time the Past Week

Prices for securities in general have been under pressure much of the time recently, but whenever it has relaxed they have snapped back quickly. Selling, in a large measure, is believed to have been based on the fear that some national disaster is imminent, either as a result of the foreign credit situation, or a nation-wide tie-up in transportation. The frequency with which new foreign issues are offered in and absorbed by this country (something more than $1,000,000,000, it is estimated, having been sold in this country since the signing of the armistice) is held to demonstrate faith in the ability of Europe and South America at large to weather in time their financial problems.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	29¾ - 31	Nat.-Acme	14¼ - 14¼
Allis-Chalm. pf..	71½ - 73⅝	Nat. E. & S. com.	47⅝ - 48¼
Am. Can com....	25½ - 26¾	Nat. E. & S. pf.. ..	- 45
Am. Can pf.....	81⅛ - 82	N. Y. Air Brake.	54½ - 55
Am. C. & F. com.	122½-124	Nova Scotia Stl..	22¼ - 22½
Am. C. & F. pf.. ..	-109½	Pressed Stl. com.	57⅜ - 60½
Am. Loco. com..	82¼ - 86¼	Ry. Stl. Sp. com.	72⅝ - 76⅝
Am. Stl. Fd. com.	25⅜ - 25½	Replogle Steel...	21 - 21¼
Bald. Loco. com.	72⅛ - 77⅜	Republic com....	45¼ - 47½
Beth. Stl. com...	48 - 50	Republic pf..... ..	- 84
Beth. Stl. Cl. B..	48⅛ - 51	Sloss com.....	33 - 34
Beth. Stl 8% pf.	97½ - 99	Sup. Stl.	- 33⅛
Chi. Pneu. Tool.. ..	- 48	Sup. Stl. 1st pf.. ..	- 94
Colo. Fuel.....	22½ - 24	Un. Alloy Stl....	23½ - 25
Cru. Stl. com....	52½ - 55	U. S. Pipe com..	13 - 14⅞
Gen. Electric....	112½-118¼	U. S. Steel com..	73⅝ - 74⅛
Gt. No. Ore Cert.	28¼ - 29⅜	U. S. Steel pf....	108⅞-109¼
Gulf States Stl..	30½ - 31¼	Vanadium Steel.	27¾ - 29½
Int. Har. com...	71½ - 74⅝	Va. I. C. & Coke.	63 - 69
Lackawanna Stl.	38 - 39¼	Westingh'se Elec.	42½ - 44⅜
Midvale Steel....	23¼ - 24⅝		

Half-Year Report of American Locomotive Co.

Gross earnings of the American Locomotive Co. for the six months, ended June 30, were $25,989,781, compared with $45,114,934 for the previous six months, ended Dec. 31, 1920. The net profit for the last six months amounted to $4,556,043, compared with $5,660,494 for the previous period. An amount equal to $12.10 per share was earned on the common stock in this last period after paying the dividend on the preferred stock. There was a surplus of $2,276,043 for the period.

According to President Andrew Fletcher, "There has been no money spent on the proposed new plant in the St. Louis district other than the cost of the land, and it is the present intention of the company to withhold active development of that property until general business requirements of the company warrant it. The total unfilled orders for new locomotives, reconditioning of old locomotives and miscellaneous work on June 30 was $4,595,958, of which domestic business was 16.5 per cent and foreign business 83.5 per cent, the foreign business being mostly for Japan, China and South Africa. At present there are but few inquiries for new locomotives either for foreign or domestic use."

Industrial Finance

Stockholders of the Baush Machine Tool Co., Springfield, Mass., have voted to exchange the 12,500 outstanding shares of common stock, par value $100, for an equal number of shares having no par value, and to issue 37,500 additional shares of common stock, no par value, to be sold from time to time. The capital now is 50,000 shares common stock, no par, and 6100 shares preferred, par $100. Willoughby H. Stuart, Jr., is president, and George D. Haskell, treasurer.

Shipments by the Westinghouse Electric & Mfg. Co. are at the rate of slightly less than $10,000,000 a month. Those for April and May were above $20,000,000, and those for June and July approximately that much, while so far this month they average less than $10,000,000. Unfilled orders on the books of the corporation are in the neighborhood of $50,000,000, whereas on April 1 they were $65,621,000.

The American Bosch Magneto Corporation, Springfield, Mass., in the six months ended June 30, operated at a loss of $40,000 to $50,000. The financial condition of the concern, however, shows its current debts amount to but $400,000, whereas its quick assets total $5,700,000. The company recently sold $2,500,000 8 per cent 15-year notes. After making allowance for these notes, there are net tangible assets of $75 a share on the 100,000 share capital, of which $28 represent net quick assets.

The earnings statement of the National Acme Co. for the three months ended June 30 shows an operating deficit of $834,362, contrasted with a deficit of $354,074 for the previous quarter, and a net profit amounting to $1,385,925 for the corresponding period last year. Sales for the second quarter were $1,435,722, as against $1,041,840 for the preceding period. The increased deficit was due, in a large measure, to the marking down of inventories, which showed a shrinkage of $523,835. Total sales for the first six months this year were $3,047,566, as compared with $9,582,369 last year, or about one-third.

The Allis-Chalmers Mfg. Co. in the quarter ended June 30 billed out $7,014,373 goods, and showed net profits after taxes of $635,879, as compared with $7,369,106 goods billed out and $832,750 net profits for the corresponding three months last year. The net profits equal, after all charges and preferred dividends, $1.34 a share earned on the $26,000,000 common stock, contrasted with $1.87 a share for the quarter ended March 31 and $2.13 for the quarter ended June 30, 1920. The total unfilled orders on the books as of June 30 last were $9,472,772, against $12,943,633 at the close of the preceding quarter.

The consolidated income account of the Steel & Tube Co. of America for the six months ended June 30 last shows gross profits of $1,555,849 and miscellaneous income of $694,377, making a total income of $2,250,226, contrasted with $6,732,006, $231,733 and $6,963,739, respectively, for the corresponding period last year. Miscellaneous charges, including taxes, amounting to $906,037, left a balance of $1,344,178, as against a balance of $6,158,912 for the six months ended June 30, 1920. Interest charges, depreciation and depletion cut down the net earnings to $25,969. Last year nothing was allowed for depreciation and depletion, consequently the net earnings before dividends were $5,325,877.

The American Heater Corporation, St. Louis, has been reorganized following the death of its president, Walter Hennig. The reorganized corporation has a capital stock of $250,000, of which $160,000 is paid. C. Norman Jones, chairman of the board, Title Guaranty Trust Co., St. Louis, is president of the new corporation, and his associates are a number of St. Louis business men. The company manufactures automatic gas-fired water heaters. Extensions are said to be planned.

During the first half of 1921, the Newton Steel Co., Youngstown, Ohio, producer of full finished sheets, earned all charges before dividends, its preferred dividend for the period and made some addition to surplus. The company started six mills in March, following a suspension, and subsequently increased the number of active units to eight. At the end of May the full complement of 10 mills was placed on the active list and the company has been operating to capacity since July 1. Orders in hand insure production at the current rate well into September. An official of the company anticipates a better showing during the second half. From 85 to 90 per cent of its output has consisted of automobile body stock.

The Franklin Tractor Co., Greenville, Ohio, on the application of a number of its stockholders, has been placed in the hands of a temporary receiver. Fred D. Koppock has been named receiver and it is likely that the plant will be operating under his management.

A suit for the appointment of a receiver for the Lane & Bodley Co., Cincinnati, has been filed in the Common Pleas Court by the administrator of the estate of H. T. Lane, who was a stockholder in the company. The company recently sold a part of its Bond Hill plant and its equipment to the American Blower Co.

The New-Way Motor Co., Lansing, Mich., manufacturer of air-cooled engines and parts, has arranged for a stock issue of $500,000.

The Midvale Steel & Ordnance Co. reports a deficit of $1,289,393 for the quarter, ended June 30, after charges, taxes, depreciation and depletion, compared with a deficit of $1,395,202 in the preceding quarter and a surplus of $4,349,498, equal to $2.17 a share on the $100,000,000 capital stock, in the corresponding quarter of 1920.

The Electro Sherardizing Co., 1743 North Randolph Street, Philadelphia, has been incorporated with a capital of $25,000, primarily to coat metals by either plating or sherardizing. At the present time the company is devoting its entire energy to the sherardizing end of the business. The company is not in the market for any equipment as it took over the equipment which was being used by the General Electric Co., Seventh and Willow streets works, as a jobbing sherardizing proposition. The company is ready to take care of custom sherardizing work, rust proofing such material as bolts, nuts, stampings, castings, nails, chains, etc. The operation of the plant is in charge of T. Liggett, Jr., who has had about 15 years experience in the sherardizing business, first being with the United States Sherardizing Co., New Castle, Pa., and then having charge of the General Electric Co.'s, Philadelphia sherardizing plant.

Machinery Markets and News of the Works

SOME PRICE REDUCTIONS

Announcements Made on Milling Machines, Turret Lathes and Sensitive Drills

No Marked Improvement in Machine-Tool Business but Inquiries Are More Numerous and Sentiment Is Better

Since the first of the month some leading manufacturers of milling machines and sensitive drills have reduced their list prices about 15 per cent, while an Ohio maker of turret lathes has reduced prices about 16 per cent. A general reduction on some types of grinders is expected, a leading manufacturer having led the way a few weeks ago. Machine-tool prices on the average are now fully 25 per cent below the peak prices of 1920.

No important business is being closed, buying in all markets being confined to single tools. A slow improvement is noted, however, in some centers and the tone is more cheerful, due doubtless to a little gain in the number of inquiries.

At Cincinnati it is expected that the Big Four Railroad will soon buy tools for which it inquired some time ago, and the list of the Missouri, Kansas & Texas, issued a few months ago, may be revived shortly. The American Sugar Refining Co., New York, is expected to close soon on about 15 tools. An Eastern car equipment manufacturer is in the market for several punches and shears. The Huckabee Tractor & Mfg. Co., Little Rock, Ark., has issued a list of about 12 machines.

It is reported from Chicago that machine-tool trade during the first half of 1921 was about 25 or 30 per cent of the volume in the first half of 1920. A slow but steady improvement over the remainder of the year is expected. July was the poorest month and August sales at Chicago have shown a slight gain.

New York

NEW YORK, Aug. 16.

A little business in machine tools has been closed within the past week and there is a slight improvement in the number of inquiries, but on the whole trade is very dull. The Dexter Folder Co., New York, bought about 12 drills, mostly single spindle, and the Durant Motor Co. bought four drills for its assembling plant at Long Island City.

Several important price reductions have been made affecting leading makes of tools. A large maker of turret lathes announced a 16 per cent cut; the principal makers of milling machines have reduced about 15 per cent; sensitive drills have been cut 15 per cent and some makes of lathes have been reduced. A general reduction on grinding machines is expected, a leading maker having reduced its prices last month. A certain low-priced lathe was cut fully 50 per cent on at least one quotation in an effort to secure the order. Machine-tool prices on the average are now from 25 to 40 per cent below the peak prices in 1920.

A better tone is evident in the crane market, but new inquiries are still rare. The greatest activity at present seems to be in the hand power crane and hoist field. Bidding on the 25-ton, 50-ft. span hand power crane with alternate quotations on the same crane electrically operated, which was inquired for by the United States Machinery Export Co., 136 Liberty Street, New York, for export to Mexico, has been closed and the order will be placed shortly. Another inquiry in the market from a Mexican source is from E. T. Bailey, Mexico City, and calls for a 2-ton hand power crane. Bidding has also closed on the 10-ton, 27-ft. span hand power crane for the New York & Pennsylvania Co., 200 Fifth Avenue, New York. The Centre Iron Works, 608 East 137th Street, New York, which recently purchased a 5-ton electric traveling crane is receiving bids on two 3-ton hand power cranes, either single I beam or underslung type.

Among recent sales are: B. M. Weiss, Philadelphia, a second-hand 15-ton Brown hoist locomotive crane to the Carrol Contracting Co., 103 Park Avenue, New York; Thomas Elevator Co., four 3-ton concrete tower hoists and the American Hoist & Derrick Co., 11 8000-lb. derrick hoists, to Dwight P. Robinson, Inc., New York, for export to Brazil. The 60-ton overhead traveling crane inquired for by the Amoskeag Mfg. Co., Boston, Mass., is reported to have been placed with the Northern Engineering Works. W. J. Rainey, Inc., 52 Vanderbilt Concourse, New York, has purchased a 10-ton hand power crane from Alfred Box & Co. The Third Avenue Railroad Co., New York, has purchased a 3-ton pillar crane from the Chesapeake Iron Works.

Blue prints and specifications covering the contract for the supply and erection at Vereeniging, Transvaal Province, of two horizontal-spindle centrifugal pumps and motors with all accessories, and one 10-ton traveling crane have been forwarded to the Bureau of Foreign and Domestic Commerce by Consul Fred D. Fisher, Johannesburg, South Africa. This material is for use in connection with the Vaal River scheme. The specifications may be examined at the bureau's district office, 734 Custom House, New York, or they will be made available at any other district or co-operative office upon request. Those interested should refer to file No. 33,592.

The Multiple Storage Battery Co., Van Wyck Avenue, Jamaica, L. I., manufacturer of storage batteries, has filed plans for a one-story addition, 60 x 120 ft., to cost about $55,000, including improvements to be made in the present plant.

The United Lamp Manufacturers' Corporation, New York, has been incorporated with a capital of $75,000 by H. Wolff, R. Press and S. Math, to manufacture electric lamps and kindred products. It is represented by E. Hollander, 8 Bline Avenue, Union, N. J.

The Pure Aluminum Co. of America, New York, has been incorporated with a capital of $100,000 by B. L. Shaw, E. E. Grabo and H. P. Armstrong, to manufacture aluminum and other metal products. It is represented by J. M. Coleman, 29 Broadway.

E. L. Westervelt, Inc., Lawrence, N. Y., has been incorporated with a capital of $50,000 by E. L. Westervelt, L. H. Hall and W. Schneider, to manufacture electric motors and kindred equipment. It is represented by Putney, Twombly & Putney, 2 Rector Street, New York.

M. T. Kelly, 249 Green Street, Brooklyn, has filed plans for a one-story foundry, 50 x 60 ft., on Provost Street, to cost about $20,000.

The Seabring Machine & Repair Co., Brooklyn, has been chartered under State laws to manufacture machinery and parts, and operate a general repair works. The incorporators are J. M. Larson, T. Carlsen and J. Johansen. The company is represented by Crowell & Rouse, 24 Broad Street, New York.

The New York Central Railroad Co., Grand Central Terminal, New York, will take bids at once for shop requirements until Oct. 1 of flexible staybolts and parts, steel wheels for locomotive and passenger car repairs, and one portable electric arc welding machine and accessories, all as per standard drawings and specifications on file at the office of W. C. Bower, general purchasing agent, Grand Central Terminal.

Frank B. Rown has leased the building at 527-33 West Fifty-fifth Street, New York, extending through to West Fifty-sixth Street, for the establishment of an automobile service and repair works.

The Bottle Guard Cap Corporation, New York, has been chartered under State laws to manufacture metal caps and kindred specialties for bottle sealing. The incorporators are E. R. Hooper, R. O. Glasser and A. Westlake. It is represented by Edwards & Bryan, 31 Nassau Street.

The Pignolet Instrument Co., 78 Cortlandt Street, New York, manufacturer of electrical instruments, has leased space in the building at 76 Greenwich Street for new works.

The Fenlind Corporation, New York, has been chartered under State laws to manufacture machinery and tools. The incorporators are C. U. Ackerlind, L. Fendrich and C. E. Lage. It is represented by V. Yardum, 110 East Fifty-ninth Street.

The Phoenix Battery Co., Inc., Brooklyn, has been incorporated under Delaware laws with capital of $1,250,000 to manufacture storage batteries and other electrical products. The incorporators are Gustav J. Frickmann, Edward Sokal, and William M. Hawkins, Brooklyn. It is represented by Arley B. Magee, 33 South State Street, Dover, Del.

The Thatcher Propeller & Machine Co., Learned Street, Albany, N. Y., is arranging a list of equipment for installation in its two one-story buildings, 120 x 270 ft., to be used as a foundry and machine works. Pember & Campaigne, 24 James Street, are architects. George Thatcher is president.

The Denby Motor Truck Co., 49 West Sixty-third Street, New York, manufacturer of motor trucks and parts, is arranging for a bond issue to total $600,000. It will also double its capital from $750,000 to $1,400,000 for proposed expansion. The main plant is located at Detroit.

The Southern Dutchess Gas & Electric Co., 89 Main Street, Beacon, N. Y., is planning for the erection of an addition to its electric power plant at East Fishkill.

The Oakfield Gypsum Products Corporation, Alabama, Genesee County, N. Y., has been incorporated with a capital of $150,000 by J. L. Hughes, J. R. Swan and H. F. Weaver, Alabama, to manufacture building blocks and other machine-pressed building products. It is represented by Hart & Senior, attorneys, Utica, N. Y.

The United Electric Light & Power Co., 130 East Fifteenth Street, New York, will build two one-story coaling towers at its power plant on Walnut Avenue, 133rd to 134th Street, 17 x 67 x 187 ft. high, to cost about $200,000, including machinery. Thomas E. Murray, Inc., 65 Duane Street, is engineer.

The Curtiss Aeroplane Export Corporation, New York, has been incorporated with a capital of $650,000 to manufacture aircraft and parts for export distribution. The incorporators are L. B. Case, W. W. Webster and P. M. Crichton, 41 East Forty-second Street.

The plant of the Sonora Co., Degraw Street and Tiffany Place, Brooklyn, manufacturer of talking machine cabinets, etc., has been purchased by David Kramer, 76-84 Ninth Street, manufacturer of woodwork products, for occupancy. The sale includes the machinery and equipment, the property being held at $400,000. Mr. Kramer has disposed of his former works to Herman Schwartz, 99 Richardson Street, Greenpoint section, cabinet manufacturer, who will establish works at this location.

The Corinth Electric Light & Power Co., Corinth, N. Y., is planning for the erection of a new electric power house.

The Excel All Puncture Proof Tube Co., Inc., Jersey City, N. J., has been incorporated with a capital of $125,000 by David A. Farrington, E. L. Williams and Frank G. Schafer, 673 Summit Avenue, to manufacture tubes for automobile tires and other rubber products.

The Joseph Foy Co., 353 Bank Street, Bridgeton, N. J., has had plans prepared for the erection of a new one-story foundry to cost about $12,000. The W. P. Cameron Engineering Co., Witherspoon Building, Philadelphia, is engineer.

The Sterling Watch Co., West Orange, N. J., has been incorporated with a capital of $200,000 by Benjamin Webster, C. B. Lee and G. H. Barbour, 100 Northfield Avenue, to manufacture watch mechanisms, precision parts, etc.

George W. Smith, Hackettstown, N. J., is planning for the erection of a one-story machine shop on North Main Street.

The General Steel Casting & Machine Co., Jersey City, N. J., has been incorporated with a capital of $125,000, to manufacture steel and other metal castings, etc. It is represented by Alfred F. McCabe, 15 Exchange Place.

The Bureau of Yards and Docks, Navy Department, Washington, is completing plans for the erection of a new power house at Lake Denmark, N. J.

The Caloric Furnace Co., 36 New Street, Newark, has been incorporated with a capital of $100,000 by Oscar H. Cushwa, W. Howard Demarest and L. M. Mullany, to manufacture pipeless furnaces and parts.

The Clinton Electric Co., 266 Springfield Avenue, Newark, has been organized to manufacture parts for electric motors and operate a general motor construction and repair works. Edward Snyder heads the company.

The Westinghouse Electric & Mfg. Co., 95 Orange Street, Newark, has discontinued the manufacture of arc lamps, arc lamp repair parts, fixtures, etc., at its local works, and in the future this line of production will be carried on at its plant at South Bend, Ind. Machinery and equipment will be transferred from Newark.

The Essex Electric Supply Co., Newark, has been incorporated with a capital of $100,000 by Harry J. and Morris Levy, and Emanuel D. Lasher, to manufacture electrical appliances. Harry J. Levy, 277 Market Street, represents the company.

New England

BOSTON, Aug. 15.

A new low record business in machine tools was made the past week in this market. Sales were confined to less than a half dozen tools, the highest price being $750, and about as many used machines were moved. In addition, several dealers have abandoned what they previously considered live prospects involving several thousand dollars' worth of equipment. School business has been disappointing also. Only one local dealer reported any increase in prospective business. Inquiries in this instance, however, are confined to single machines and all are either low or medium-priced tools.

Sentiment regarding business this fall nevertheless is cheerful, although no great expansion is anticipated. The United Shoe Machinery Corporation, Boston, in July had the best month since March and the cotton and woolen industries are more active. Many metal-working plants now closed are expected to resume operations after Labor Day, and more activity among foundries is anticipated, especially in the textile machinery and heating appliance lines. In contrast, the electrical appliance business gives little evidence of improving in the near future and machine-tool houses have given up hope of purchases by New England railroads this year.

Stone & Webster are asking bids on one 50 and one 10-ton crane for the Ford plant at Green Island, N. Y.; the Power Construction Co., Worcester, Mass., on a 15 or 20-ton motor-driven or hand-operated crane, and the Government on one 50-ton crane for South Boston, bids for which will close Sept. 7.

The Chisholm-Moore Mfg. Co., Cleveland, has reduced prices 10 points on chain hoists. The Stanley Rule & Level Co., New Britain, Conn., has reduced prices on gages approximately 10 per cent.

The Great Northern Paper Co., Millinocket, Me., has awarded contract for a one-story repair shop, 102 x 218 ft., at Greenville, Me.

C. G. Garrigus, Bristol, Conn., has purchased 50 acres in Tylerville, Conn., and is perfecting plans for the erection of a plant to manufacture machinery.

The State of Maine has awarded contract for the erection of a State training school at Fort Kent. Augustus O. Thomas, superintendent of public schools, Augusta, Me., is supervising the work.

The metal and wooden toy business conducted by Rene P. Provencal, West Brookfield, Mass., has been acquired by Dubois Brothers, Inc., that town, capitalized for $25,000, recently granted a Massachusetts charter.

Plans are being prepared by Westcott & Mapes, Inc., engineers, New Haven, Conn., for a one-story, 80 x 100 ft. power plant in the rear of 170 Temple Street, for the Edward Malley estate, to cost about $150,000.

A charter has been granted the Arrow Light Co., Inc., Springfield, Mass., to manufacture an automobile traffic signal indicator. It is capitalized for $30,000. Gordon W. Gordon, Springfield, is president, and T. M. Marczal, Chicopee, treasurer.

Anton J. Haug, Taylor Road, Nashua, N. H., is president, and Joseph Simon, 11 Orvis Road, Arlington, Mass., treasurer of the Haug Paper Machine Co., 135 Essex Street, Boston, capitalized for $100,000, recently granted a Massachusetts charter to manufacture paper machinery.

The Baum Dairy Appliance Co., Natick, capitalized for $175,000, has been granted a Massachusetts charter to manufacture dairy, surgical and hospital supplies, machines, dies, tools, etc. Ewald C. Baum, 19½ West Central Street, is president, and Hallett E. Jones, 66 Walnut Street, treasurer.

The New Haven Sherardizing Co., Hartford, Conn., will move its subsidiary, the Middlesex Machine Co., Bridge Street, Middletown, Conn., to Hartford, where it will be operated in connection with the plant at 868 Windsor Street. The Middlesex company manufactures the Connecticut universal grinding machine and special machinery.

The Williams & Anderson Co., 33 Broad Street, Providence, R. I., manufacturer of emblems and other metal specialties, has acquired property, comprising about 70,700 sq. ft., as a site for a new plant.

The Bureau of Yards and Docks, Navy Department, Washington, will take bids until Aug. 24 for equipment for in-

stallation at the power house at the naval plant, Boston; also, until Sept. 7, for one 50-ton steam crane for use at the Government drydocks, South Boston.

The H. L. Judd Co., Wallingford, Conn., manufacturer of iron and brass beds, brass hardware specialties, etc., has plans under way for an addition to cost about $100,000, including equipment.

C. F. Luce, 36 Pearl Street, Hartford, Conn., architect, is preparing plans for a new six-story machine and repair works, and automobile service building, 150 x 150 ft., on Hicks Street, estimated to cost in excess of $300,000. The owner's name will be announced at an early date.

The Waterbury Metal Mfg. Co., Waterbury, Conn., recently incorporated to manufacture metal products, has been organized with Hans Rasmussen, Bradley Avenue, as president and treasurer; and A. R. Rasmussen, same address, as vice-president.

Otto W. Siebert, Gardner, Mass., formerly treasurer and general manager of the Bay State Metal Wheel Co. and the Children's Vehicle Co., both of East Templeton, Mass., has leased buildings on Main and Logan streets, Gardner, for the establishment of a new plant to manufacture fiber products. The two factories total about 50,000 sq. ft. of floor space. Later it is proposed to construct a new plant.

The Malden Electric Co., Malden, Mass., has filed plans for an addition to its power house at Broadway and Oakland Avenue, to cost about $75,000.

The Osgood-Bradley Car Co., Worcester, Mass., has taken an order from the New York, New Haven & Hartford Railroad Co., New Haven, Conn., for the construction of 22 electric cars for its electrified zone, to cost about $1,400,000. The electric equipment will be furnished by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

James F. Cleary, Jr., 112 Maple Street, Holyoke, Mass., has filed plans for a one-story machine shop on Maple Street, to cost about $15,000.

A one-story power house will be erected by the Gardner Reed & Rattan Co., 323 Pleasant Street, Gardner, Mass., in connection with the construction of a new factory on West Broadway.

The Yankee Carbon Monoxide Burner Co., Providence, R. I., recently organized, has been chartered under State laws with capital of $50,000 to manufacture oil-burning heating devices and equipment. The incorporators are R. A. Morse and Roy J. Oberemeyer, 59 Park Street.

Chicago

CHICAGO, Aug. 15.

It is believed that machine tool sales in this district reached the low water mark in July. One representative dealer reports that he has closed twice as much business thus far in August as was booked in the entire previous month. While orders are still light, the situation is slowly improving. Store trade has picked up and small miscellaneous orders, particularly from automobile accessory makers and repair shops, are more numerous. A fair-sized automobile accessory plant in this vicinity is reported to be running full. There has been no further business from the railroads. The formal letting of the Illinois Central machine tool orders has not yet been made, but is expected at any time. The Santa Fe is again taking figures on a number of large cranes for its Albuquerque, N. M., shops and is expected to place orders in the near future. It is also considering the revival of inquiries for the tools which were not bought when the first purchases were made for Albuquerque some months ago. The Marvel Machinery Co., Minneapolis, manufacturer of automobile axles and other accessories, has issued a list of about 75 tools, part of which are understood to have been placed. Buying is being handled in Chicago by Mr. Bouthinon at the offices of the F. C. West Corporation.

The Huckabee Tractor & Mfg. Co., 704 South Valmar Street, Little Rock, Ark., recently organized, has issued the following list:

One No. 2 universal milling machine with vertical head.
One 26-in. x 14-ft. engine lathe.
One 16-in. x 8-ft. heavy duty precision lathe.
One ½-ton electric crucible.
One power hack saw.
One emery stand.
One 15-hp. high-speed electric motor.
One No. 2 universal grinding machine.
One automatic or semi-automatic gear machine with capacity to cut gears up to 24 in.
One 20-in. crank shaper.
One 24-in. drill press.
One molding machine with 24-in. x 48-in. table.

The city of Chicago, Department of Supplies, is in the market for a 20-in. upright drill, and the Board of Education is inquiring for a three-spindle drill for the Senn High School and three bench lathes for the Harrison Technical High School.

A review of the first half of this year indicates that sales by dealers did not average more than 25 or 30 per cent of those for the first six months of 1920. A slow but steady increase in buying is looked for in the next six months.

A number of important price changes have been made recently. Two Western manufacturers of milling machines have reduced prices 15 and 12½ to 15 per cent respectively, and an Ohio maker of turret lathes has cut quotations 16 per cent.

The Kaestner & Hecht Co., manufacturer of elevators, now at Throop and Harrison streets, Chicago, has bought from A. M. Castle & Co., 102,000 sq. ft. at the northeast corner of Blackhawk and North Branch streets, improved with two seven-story buildings. It will spend $100,000 on improvements and alterations before occupying.

The Campbell Mfg. & Foundry Co., Lake front and Lake Street, Muskegon, Mich., has changed its name to the Muskegon Castings Co.

The Sapihl Electric Tool Co., Galesburg, Ill., has been incorporated with $36,000 capital stock to manufacture machinery and electrical appliances. The incorporators include G. A. Swenson, Fred Peterson, Henry M. Hawkinson, Karl Pihl and G. H. Lorberg.

The Illinois Steel Co., South Chicago, Ill., has a permit to construct a three-story electric power station, 93 x 375 ft., between Eighty-sixth and Eighty-seventh streets, to cost $250,000.

The Advance-Rumely Co., La Porte, Ind., manufacturer of farm implements, has preliminary plans under way for a one-story brick and concrete addition. J. C. Llewellyn, 38 South Dearborn Street, Chicago, is architect.

The North American Car Co., 328 South La Salle Street, Chicago, has preliminary plans under way for a one-story shop, 80 x 120 ft., at 135th Street and California Avenue, Blue Island, Ill., to cost $40,000. Bids are expected to be asked for some time this month.

The Niagara Radiator & Boiler Co., North Tonawanda, N. Y., has purchased from Briggs & Turivas 10 acres at the southwest corner of Eighty-third Street and Woodlawn Avenue, Chicago, and plans to improve the property with a foundry, 140 x 175 ft. Ultimately a four-story warehouse will also be built, the total contemplated improvements involving about $250,000.

The Equipment Corporation of America, represented by H. M. Capron, 11 South La Salle Street, Chicago, has postponed for two years the erection of a large plant at Maywood, Ill., for rebuilding contractors' equipment.

The Sheridan-Wilson Garage Co., 64 West Randolph Street, Chicago, will receive bids through W. G. Uffendell, 39 South State Street, on a three-story reinforced concrete garage, 75 x 200 ft., at 4616-32 Winthrop Avenue, to cost $150,000.

John E. Decker has leased to the Yellow Cab Co., Chicago, a tract, 140 x 260 ft., at the northeast corner of Flournoy Street and La Vergne Avenue, and will erect a one-story plant to cover the area at a cost of $100,000. The lease is for a 20-year term.

The Middle West Utilities Co., 72 West Adams Street, Chicago, has arranged for a note issue of $1,500,000, the proceeds to be used for extensions, improvements and general operation of power plants and system.

The Producers & Refiners Corporation, Waterloo, Iowa, operating the plant of the Hawkeye Oil Co., recently acquired, has plans under way for its new refinery at Casper, Wyo., with initial unit of about 3000 bbl. per day capacity. Later the plant will be extended with output of close to 10,000 barrels daily, with lubricating oil manufacturing works. The complete project is estimated to cost close to $5,000,000, including machinery.

The G. A. Ball Bearing Co., 3051 West Lake Street, Chicago, will call for bids at once for its one-story addition, 205 x 230 ft., at West Lake Street and Albany Avenue, estimated to cost about $65,000. Burrett H. Stephens, 37 West Van Buren Street, is architect.

The Great Western Automobile Co., 22 East Michigan Street, Duluth, Minn., is completing plans for a new two-story, and basement automobile service and repair works, 100 x 400 ft., at 2533 West Superior Street, estimated to cost about $200,000 with equipment. Gustave Berquist is president.

The Board of Education, Dubuque, Iowa, is arranging a list of equipment for installation in the manual training de-

partment at the proposed new high school. N. Palen, Bank and Insurance Building, Dubuque, is secretary of the board.

The American Wire Fabric Co., 208 South La Salle Street, Chicago, has filed plans for a new one-story building, 47 x 145 ft., at Blue Island, Ill., to be equipped as a galvanizing works. A warehouse will also be erected. The structures are estimated to cost $100,000.

Buffalo

BUFFALO, Aug. 15.

The Positive Traction Motors Corporation, Buffalo, has been incorporated with a capital of $500,000 by F. X. Irr, R. E. and M. G. Dussau, to manufacture automotive machinery, motors, etc. It is represented by W. J. Bullion, Ellicott Square.

The Milling & Lighting Co., Brasher Falls, N. Y., is planning for the construction of a new electric power plant at St. Lawrence.

The Crostholz-Treiber Co., Rochester, N. Y., has been incorporated with a capital of $24,000 by C. C. and J. N. Crostholz, and W. C. Treiber, Rochester, to manufacture tools, piston rings and kindred products. It is represented by Melvin & Melvin, White Memorial Building, Syracuse, N. Y.

The Buffalo Aeroplane Corporation, 1059 Main Street, Buffalo, has filed notice of dissolution under State laws.

The Rochester Automatic Tool Corporation, Rochester, N. Y., has been incorporated with a capital of $100,000 by J. J. Appel, H. F. Stablerodt and M. J. Landau, to manufacture machinery, tools and dies. It is represented by Bryan & Bryan, Powers Building.

The Reznoir Corporation, Alden, N. Y., has been incorporated with a capital of $30,000 by H. M. Dent, C. E. Leffel and F. J. Moore, Alden, to manufacture molded mechanical products, etc. It is represented by A. W. Plumley, Mutual Life Building, Buffalo.

The Hogle Motor Sales Co., East Main Street, Malone, N. Y., is completing plans for a new three-story automobile service and repair works on East Main Street, to cost about $150,000. W. Hogle is head of the company.

Generators and transformers were damaged beyond repair when fire destroyed the power house of the Wickwire Limestone Co., Gasport, N. Y., Aug. 7. The loss is estimated at $30,000.

Philadelphia

PHILADELPHIA, Aug. 15.

The Richter Machine Co., Van Kirk and Erdrick streets, Philadelphia, manufacturer of textile machinery and parts, has filed plans for a one-story addition, estimated to cost about $10,000. Wolfang Richter is head.

The American Steel Equipment Co., Philadelphia, has been incorporated with a capital of $25,000 to manufacture steel specialties. H. C. Ramsberger, 18 South Eleventh Street, is treasurer.

The United States Heating Appliance Co., Philadelphia, has been chartered under Delaware laws to manufacture heating equipment and appliances. The incorporators are Harold C. Lansinger, Frank A. Cabeen, Jr., Philadelphia; and Edward L. Reeves, Paulsboro, N. J. The company is represented by the United States Corporation Co., Commonwealth Building.

Thomas McGinnis, 1752 North American Street, Philadelphia, has filed plans for a one-story addition to his machine shop at 1716-18 North American Street.

The Philadelphia Rapid Transit Co., 1520 Spruce Street, Philadelphia, has awarded contract to Henry E. Baton, 1713 Sansom Street, for a new one-story car repair works at Thirty-first and Dauphin streets, to cost about $50,000.

The Electro Self-Winding Phonograph Co., Philadelphia, has been incorporated under Delaware laws with capital of $100,000 to manufacture talking machines with self-winding spring motors and parts. It is represented by F. R. Hansell, Land Title Building.

Plans for a new power house for the Logan Baking Co., Philadelphia, are being prepared by T. F. Miller, 1012 Walnut Street, Philadelphia, architect, in connection with a new three-story plant.

The Motor Theft Protector Co., Philadelphia, has been incorporated under Delaware laws with capital of $100,000 by Ralph C. Stewart, Lansdowne, Pa.; William B. Lex and Harry S. Mangin, Philadelphia, to manufacture safety devices and appliances. It is represented by the Corporation Trust Co., Land Title Building.

The Victor Lens Mfg. Co., Camden, N. J., has been incorporated with a capital of $125,000 by Clifford A. Baldwin, George D. Rothermel and Albert E. Burling, 520 Market Street, to manufacture lenses and kindred products.

The Witte Sales Co., Camden, N. J., has been incorporated with a capital of $100,000 by Stephen M. Paschall, John E. Fennell and Edmund A. Witte, 214 Broadway, to manufacture electrical appliances and equipment.

The Universal Coal Machine Co., Little Building, Boston, manufacturer of coal-working machinery, is planning for the establishment of new works in the vicinity of Trenton, N. J., and is in communication with the Chamber of Commerce for the purchase of an existing plant.

The State Purchasing Department, Capitol Building, Trenton, N. J., is considering the installation of a refrigerating plant in the building on Perrine Avenue, recently acquired for $58,800, and heretofore owned by F. A. Poth & Sons. Edward E. Grosscup is State purchasing agent.

The Daniels Motor Co., Reading, Pa., manufacturer of automobiles, has tentative plans under way for new works at Philadelphia for complete car manufacture, including motors and chassis, estimated to cost close to $500,000 with machinery. George E. Daniels is president.

The Harrisburg Corporation, Harrisburg, Pa., operating the Harrisburg Foundry & Machine Co., Seventh and Curtin streets, has acquired a substantial interest in the plant and business of the Henry, Millard & Henry Co., Inc., 1059-65 West Market Street, York, Pa., manufacturer of gasoline engines and tractors, and operating general machine repair works. Plans are under way for enlargements.

The Keystone Supply & Mfg. Co., Bethlehem, Pa., manufacturer of pipe, steam supplies, plumbing equipment, etc., has plans under way for a new two-story factory to cost about $200,000, with equipment.

F. A. Seiberling, formerly president of the Goodyear Tire & Rubber Co., and now head of the Lehigh Tire & Rubber Co., New Castle, Pa., comprising the plant and business of the New Castle Tire & Rubber Co., recently acquired, is said to have merger plans in preparation for a consolidation of the local works with the Republic Rubber Co., Akron and Canton, Ohio, now operating under a receivership, and the Portage Rubber Co., Akron, in which a substantial interest has been secured. The Republic Rubber plants will be made the principal units in the merger.

The Bessemer Truck Co., Grove City, Pa., has been incorporated under Delaware laws, with capital of $100,000 by L. M. Monroe, I. M. Lewis and C. G. Keller, Grove City, to manufacture automobile trucks. The company is represented by the Capital Trust Co., Dover, Del.

The International Mfg. Co., Weatherly, Pa., recently organized, has arranged for the immediate operation of a plant for the manufacture of metal screens and kindred specialties.

The Fayetteville Electric Light & Power Co., Fayetteville, Pa., is being organized by I. S. and C. W. Sollenberger, Greene Township, Franklin County, for the operation of an electric power plant. Application for a State charter will be made on Aug. 22.

Samuel L. and Harry H. Light, and Thomas S. Quinn, all of Lebanon, Pa., and interested in local iron and steel companies, have acquired the plant of the Rivetless Chain & Engineering Co., Avon, Pa., specializing in the manufacture of chains, iron and steel forgings, etc. The new owners will continue the operation of the works.

Pittsburgh

PITTSBURGH, Aug. 15.

A more cheerful tone is observed in the machine tool market, due to inquiries being more numerous. While many of these are merely for the purpose of getting quotations for appropriation purposes, hopes run strong that the last quarter of the year will see a definite increase in orders. The Wheeling Steel Corporation is going ahead with its program of improvements at the LaBelle Iron Works, Steubenville, and has placed an order for a 19-in. 6-stand, continuous bar mill with the Morgan Constructions Co., Worcester, Mass. In the next few days it is expected to put out a formal request for bids on a 35-in. blooming mill and a blooming mill engine. Informal inquiries on this equipment were issued recently. Through the John F. Casey Co., Pittsburgh, the Toledo Crane Co. has secured an order for a 20-ton, 67-ft. overhead crane for installation at the municipal pumping station of Nashville, Tenn. In machine tools is noted the sale of three Fay & Egan motor-driven wood-working machines to a West Virginia lumber company. Machine tool business, as far as actual orders are concerned, still is limited, but dealers are working on several promising inquiries which they hope to close in the near future. The question of price is the dominant factor in sales at present. The Westcott

Chuck Co., Oneida, N. Y., has issued a new list cutting prices from 16⅔ to 25 per cent.

The Ephrata Metal Products Corporation, Ephrata, Pa., has issued an inquiry for a 12-in. or 14-in. x 6-ft. engine lathe, a No. 3 V & O 30-ton inclinable power press, No. 1½ Brown & Sharpe or Rockford universal milling machine, Norton or Greenfield tool grinder, and a small portable filing machine.

The Pennsylvania Tank Car Co., Sharon, Pa., will build an addition costing about $100,000 to its plant at Petroleum, to be used as a repair shop. Machinery for the fabrication of steel parts entering into the manufacture of cars will also be installed. An appropriation of $100,000 for the erection of a similar plant at Argentine, Mo., has also been made. Construction will start immediately and is to be completed in 90 days.

The American Steel & Wire Co., Fifteenth Street and Pennsylvania Avenue, Pittsburgh, has acquired property at Braddock, 76 x 100 ft., for $35,000, to be used for extensions.

The West Penn Power Co., Pittsburgh, has arranged for a bond issue of $3,000,000 for extensions, improvements, general operations, etc.

The Wire Products Corporation, Oakmont, Pa., has been chartered under State laws to manufacture wire goods and other steel products. James W. MacFarlane, Woodland Road, Pittsburgh, is treasurer.

The Du Roth Steel Truck & Car Wheel Co., Pittsburgh, has been incorporated under Delaware laws with capital of $500,000 to manufacture steel trucks, car wheels and other iron and steel products. It is represented by Wilber A. McCoy, 237 Fourth Avenue.

The Union Ice Co., Pittsburgh, has filed plans for the erection of a two-story plant, 75 x 100 ft., at 817 Beaver Avenue, to cost about $100,000 with equipment.

The United States Engineer Office, Pittsburgh, will receive bids until 12 noon, Sept. 2, for the construction of 3 steel deck barges. Plans and specifications are on file at the local office.

The Seyler Mfg. Co., Pittsburgh, has been incorporated with a capital of $100,000, to manufacture hardware products. J. T. Seyler, 525 Aspen Street, is treasurer.

The Brownsville Window Glass Co., Brownsville, Pa., is planning to rebuild its plant destroyed by fire Aug. 6, with loss estimated at about $300,000, including machinery. W. S. Phillips is general manager.

The Leevale Coal Co., Leevale, W. Va., is planning for the construction of a new steel tipple at its local properties. Headquarters of the company are at Charleston, W. Va. D. H. Morton is general manager.

The Holdred Collieries Co., Blair, W. Va., will build a new tipple, install shaker screens and make other extensions and improvements at its local properties. R. S. Wing is manager.

The Ohio & Pennsylvania Coal Co., Wheeling, W. Va., has completed plans for the construction of a new tipple at its Yorkville mine, near Wheeling.

Detroit

DETROIT, Aug. 15.

The local machine-tool market is improving slightly. Inquiries are on the increase and a larger number of single orders are coming through. No great betterment is expected, however, in the immediate future.

The plant of the American Car & Foundry Co. in Detroit will reopen the middle of September with an order for 500 new steel hoppper cars from the New York Central Railroad. This will give employment to about 1000 men, although the normal force is 2000. Two months ago the plant was closed after finishing the overhauling of 5000 freight cars.

The Hart Quick Change Rim Co., Hart, Mich., has been organized with a capitalization of $100,000 by L. P. Hyde, George W. Powers and Frank Demmon, Hart, to manufacture a new collapsible rim attachment for motor cars.

The Cameron Motors Corporation, New York, has purchased the implement plant of Cass T. Wright, Greenville, Mich., for the production of parts for the Cameron air-cooled car and Sandusky tractor. About 400 men will be employed.

M. Brownell, Battle Creek, Mich., who recently purchased the business and patents of the True Mfg. Co. of that city, states that the business will be located in Eaton Rapids, Mich. Construction on a new factory will be started soon.

King Brothers, Marquette, Mich., will establish a boiler and iron works at Houghton, Mich., to be known as the Northern Boiler & Iron Works. It will specialize in boiler repairing and acetylene welding.

Everett Winters, contractor, Detroit, has begun work on the construction of a $250,000 hydroelectric plant on the Boardman River for Traverse City, Mich.

The Howell Washing Machine Co., Howell, Mich., has been incorporated with a capital of $60,000 by William M. and Chester L. Schwartz, Howell, and Julius Englander, 59 Forty-second Boulevard, Detroit, to manufacture electrically operated washing machines and parts.

The American Forging & Socket Co., Branch and Air Line streets, Pontiac, Mich., is completing plans for a new one-story foundry, estimated to cost about $30,000.

The Morton Mfg. Co., Muskegon Heights, Mich., has been incorporated with a capital of $150,000 by Henry E. Morton, Mason B. Morton and William Rowan, Jr., Muskegon Heights, to manufacture agricultural machinery and implements.

The Reynolds Roofing Co., Grand Rapids, Mich., is planning to rebuild its main plant, destroyed by fire, Aug. 3, with loss reported in excess of $200,000, including equipment.

The Forth Resilience Mfg. Co., Detroit, has been incorporated with a capital of $100,000 by William Edelstein, W. J. Spearman and Charles Forth, 66 Lawrence Avenue, Royal Oak, Detroit, to manufacture automobile parts and other automotive equipment.

The Ravena-Conklin Electric Light & Power Co., Ravena, Mich., will soon take bids for the construction of a new hydroelectric power plant, to cost about $85,000. Holland, Akerman & Holland, 106 East Liberty Avenue, Ann Arbor, Mich., are engineers.

The Kess-Line Motors, Inc., Detroit, has been incorporated with a capital of $500,000 by Peter De Vries, William L. Kraetke and Charles A. Greenwood, 626 Orange Street, Wyandotte, Mich., to manufacture automobile tractors, engines and similar products.

The Ford Motor Co., Detroit, has construction under way on a new building at Northville to be equipped as a welding works, and used primarily in connection with the manufacture of valves and valve stems.

Baltimore

BALTIMORE, Aug. 15.

Lyon, Conklin & Co., 13 Balderstone Street, Baltimore, manufacturers of sheet metal products, have arranged with the city for the closing of a portion of Race Street, the property to be used in connection with the erection of an addition.

The Bull Dog Lock Washer Co., Baltimore, care of the Industrial Bureau, Board of Trade, Munsey Building, is arranging for the establishment of a local plant to manufacture special lock washers and kindred products.

The National Differential Mfg. Co., Takoma Park, Washington, has been incorporated under Delaware laws, with capital of $250,000, by Anthony J. Casel, and George E. Gaylord, Takoma Park, and Joseph B. Simpson, Brightwood, D. C., to manufacture axles and similar equipment for automobiles. It is represented by the Capital Trust Co., Dover, Del.

Considerable electrical and mechanical equipment, including loaders, conveyors, transmission machinery, etc., will be installed at the new grain elevator of the Western Maryland Railroad Co., Continental Building, Baltimore, to be located at Port Covington. It will duplicate the company's present plant here and is estimated to cost in excess of $1,000,000. Plans have been completed.

The Phillips Steam Car Co., Wilmington, Del., has been incorporated with a capital of $5,000,000 to manufacture steam-driven automobiles. It is represented by the Colonial Charter Co., Ford Building.

The Board of Harbor Commissioners, Wilmington, Del., has awarded a contract to the du Pont Engineering Co., du Pont Building, for the construction of its proposed new marine terminal at a cost of $1,372,570. It will be equipped with loading and unloading machinery, hoisting and conveying apparatus, etc.

Plans are nearing completion for the proposed new paper mill to be erected by the Gwynns Falls Paper Co., 517 Calvert Building, Baltimore, on property recently acquired at Gwynns Falls, and bids will soon be asked. The main mill will be one, two and three-stories, 75 x 400 ft., estimated to cost about $250,000 with machinery. Joseph H. Wallace, 5 Beekman Street, New York, is engineer. George W. Davis is head.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until Aug. 31, for the construction of an addition to the power house at the naval grounds, Annapolis, Md., including ash bunker, coal bunker and other work. On the same date, the department will receive bids for a new gun shed at the Marine Barracks Reservation, Navy Yard, Norfolk, Va. Until Sept. 21, the department will receive bids for a one-story machine shop, 181 x 520 ft., at

the Naval Station, Pearl Harbor, H. T. C. W. Parks is chief of the bureau.

The Norfolk & Western Railway Co., Norfolk, Va., Room 351, J. H. Clemmitt, purchasing agent, will receive bids until 12 o'clock noon, Aug. 24, for about 75,000 lb. of soft steel bars, 120 rods of wire fencing, electrical material, parts for electrical apparatus, and parts for pumping machinery.

The Atlantic Ice & Coal Corporation, Atlanta, Ga., is planning for extensions and improvements in its ice-manufacturing and cold storage plants at Atlanta, Decatur and Fort Valley, Ga. The work is estimated to cost about $700,000, of which about $500,000 will be used for doubling the capacity of the Atlanta plant, and $100,000, each, for work and equipment at the two other points.

The Earley Process Materials Co., Washington, has been incorporated with a capital of $25,000 by John B. Earley, B. B. Taylor and Henry W. Heine, Washington, to manufacture concrete products and other materials. It is represented by the Delaware Registration Trust Co., 900 Market Street, Wilmington, Del.

The Carolina Shipyards, Wilmington, N. C., have been purchased by the Maryland Wrecking Co., Baltimore, which plans for the early dismantling of the plant. John E. Smith is president of the purchasing company.

Milwaukee

MILWAUKEE, Aug. 15.

Conditions in the machine tool market appear somewhat brighter, inquiries as well as actual orders placed having shown at least slight improvement in the last two weeks. Volume is lacking, however, and transactions almost invariably involve a single machine. Orders originate in a scattering way, with the automotive industries predominating as the source. A few orders from railroads have been booked. Production remains at a low ebb and it is not believed that any material increase in output will be necessary until after Sept. 1.

The Chicago, Milwaukee & St. Paul Railway Co., 80 East Jackson Boulevard, Chicago, is reported to have instructed its engineering department to prepare tentative plans and secure estimates of the cost of erecting a new grain elevator and storehouse at Lake and Greenbush streets, in Milwaukee, to replace the plant known as Elevator A, which was destroyed by fire Jan. 16. It is to be of reinforced concrete, 85 x 285 ft., 85 ft. high, and cost about $1,500,000, including a full complement of new elevator, electric motor and power equipment, boilers, etc. Work probably will be undertaken early next spring, but the substructure may be built during the fall and winter. C. F. Loweth is chief engineer, and C. P. Rawson, chief architect, with offices at Chicago. The company is also making preliminary plans to rebuild the main car repair department of the West Milwaukee car and locomotive shops, destroyed by fire a year ago. The investment in buildings and equipment will be about $350,000. C. F. Loweth, 80 East Jackson Boulevard, Chicago, is chief engineer.

The Capital City Pattern Co., Madison, Wis., will build an addition at 613 Williamson Street, to cost about $15,000, including equipment. W. J. Gregerson is president.

The Andrew Mfg. Co., 533-545 Thirtieth Street, Milwaukee, has changed its corporate title to the Wehr Co. It was originally founded as the Andrew Motor Mfg. Co., at 736 Windlake Avenue, to manufacture rowboat and canoe motors. Later it was converted into a commercial machine shop. About a year ago the business was acquired by members of the Wehr Steel Co., Milwaukee, a manufacturer of electric steel castings for the automotive and agricultural machinery industries, and moved to its present location. E. R. Wehr is president, and William K. Andrew, vice-president and general manager.

The Service Auto Spring Co., 426 Sycamore Street, Milwaukee, manufacturer of motor vehicle springs and accessories, has changed its name to the Widmeyer Auto Spring Co., E. F. Widmeyer, secretary-treasurer and general manager.

The Lincoln Light Corporation, Milwaukee, organized several months ago with a capital stock of $150,000, has started operations in its new factory erected as an addition to the plant of the Jungers Stove & Range Co., at Grafton, Wis. The offices also have been moved from Milwaukee to Grafton. The Lincoln company will manufacture a self-contained electro-generating unit designed for lighting farms and other isolated places.

The Silent Washer Mfg. Co., Clintonville, Wis., which erected a new factory the past year, has completed all experimental work and is starting quality production of domestic washing machines with manual, belt power and direct electric motor power. For the present it is buying its castings from outside foundries, but it is planned to erect an addition to house a casting shop within the coming year. O. R. Schwantes is president.

Cincinnati

CINCINNATI, Aug. 15.

No material improvement is noted in the machinery market. While undoubtedly a better feeling prevails, it has not yet been demonstrated in the number of orders placed. Local manufacturers report scattered orders for one or two machines, but business continues light. A number of lists, however, are expected to close during the week, including those of the American Sugar Refining Co. and the Big Four Railroad. A list issued some months ago by the Missouri, Kansas & Texas Railroad, and on which no action has been taken, will likely be revived shortly. An Eastern car equipment company is inquiring for several punches and shears and the Ford Motor Co. is reported to be in the market for at least one planer. Several machine-tool manufacturers in this district have completed contracts on which they had been working for some months for duplication of rolling mill equipment for India.

Local jobbing foundries are running at approximately 15 per cent of capacity. Stove shops in the district, however, are showing some improvement and some estimates place their rate of operation at approximately 60 per cent.

No price changes on machine tools are reported. In this connection an item in last week's issue stating that an Eastern manufacturer of shapers had reduced prices approximately 15 per cent has been denied.

The Merkel Brothers Co., Cincinnati, jobber in plumbing supplies, is having plans prepared for a warehouse containing 200,000 sq. ft. of floor space in the Walnut Hills section. The building will be 100 x 400 ft., five stories. Bert Baldwin, Second National Bank Building, Cincinnati, is the architect.

The Dayton Paper Products Machine Co., Dayton, Ohio, has been incorporated with a capitalization of $10,000 to manufacture machines for assembling paper milk bottles. The machine is the invention of William Brown, Dayton, who, with Otto C. Crisp and W. J. Seifried, is one of the incorporators.

The Central South

ST. LOUIS, Aug. 15.

The first large order to be placed by the railroads for some time is reported this week. Manning, Maxwell & Moore, Inc., sold the Missouri Pacific a 42-in. motor-driven drill press for its shops, at Sedalia, Mo., and a 23B Greenlee Brothers mortiser for the Dupo, Ill., shops.

The Yard-O-Meter Corporation, St. Louis, manufacturer of measuring and computing machines for textiles, has leased larger quarters, in the Lucas Building, at Fourth and Locust streets.

The Standard Machine Works, Memphis, Tenn., is planning for enlargements in its plant for the manufacture of locomotive equipment. W. W. Jones is head.

The United Light & Power Co., Abilene, Kan., and the Pawnee Power & Water Co., Larned, Kan., have been merged under the name of the United Light & Power Systems, Inc. The consolidated company is planning for extensions and improvements in its different power plants and systems.

The Kentucky Block Fuel Co., Pikeville, Ky., has completed plans for the construction of a new tipple at its plant, estimated to cost about $25,000. Charles K. Wagner is vice-president in charge.

The Mississippi River Commission, Customhouse, Memphis, Tenn., will receive bids until 11 a. m., Sept. 5, for the construction of 13 steel barges, as per plans and specifications on file.

The Board of Directors, State Hospital, Fulton, Mo., is considering plans for a new power house to cost about $45,000. M. O. Biggs is superintendent.

The Missouri, Kansas & Texas Railroad Co., St. Louis, is planning for the conversion of its steam locomotives to oil burning operation, and will begin work at an early date. The improvements, including equipment for storing and handling oil, etc., is estimated to cost about $1,000,000.

C. W. Squires, Galena, Kan., is planning for the construction of a new rock crushing plant, with initial capacity of about 225 tons per day.

The Lock Joint Pipe Co., Kansas City, Mo., will commence the erection at once of its new plant at Webb City, Mo., for the manufacture of reinforced cement pipe and kindred products. The initial plant will cost about $125,000.

The Arkansas Royalty Co., Little Rock, Ark., has plans under way for a new refinery at El Dorado, Ark., with initial output of about 5000 gal. per day. Lee Miles is president.

The Board of Directors, Federal Penitentiary, Leavenworth, Kan., W. I. Biddle, warden, has approved plans for the construction of a new power plant at the institution to cost about $145,000, including boilers, engines and auxiliary machinery.

The Board of City Commissioners, Pawhuska, Okla., has plans under way for an addition to the municipal electric power plant. A list of equipment will be prepared at an early date.

The Kansas City Power & Light Co., Kansas City, Mo., has completed plans for the construction of a new one-story power house at Sixty-first and Forest streets 60 x 90 ft. A. E. Beltis is chief engineer.

Indiana

INDIANAPOLIS, Aug. 15.

The Active Coal Co., 607 Board of Trade Building, Indianapolis, Ind., has plans under way for a new coal-handling plant at Fourteenth and Senate streets, to cost about $50,000. Bacon & Teislow, 30 West Ohio Street, are engineers. P. M. Gale is president.

The Arctic Corporation, Michigan City, Ind., has been incorporated with a capital of $200,000, by E. E. Mikesell, H. L. Henry and S. W. Wilhelm, Michigan City, to manufacture refrigerating machinery and parts.

The Interstate Car Co., Massachusetts Avenue and Sherman Drive, Indianapolis, manufacturer of automobiles, has filed plans for a one-story addition to cost about $25,000.

The Standard Electric Co., Hammond, Ind., has been incorporated with a capital of $25,000 by W. R. Wermine, Ernest Freeman and Oliver W. Hershman, Hammond, to manufacture electrical equipment.

The Spurgeon Brothers Mfg. Co., Muncie, Ind., has been chartered under State laws to manufacture automobile equipment and parts. The incorporators are K. A., W. W. and W. C. Spurgeon, Muncie.

The United States Radiator Corporation, Indianapolis, has leased a building, 50 x 150 ft., on Senate Avenue, now being constructed by Marks Brothers, for the establishment of a new assembling plant. A portion of the structure will be used for storage. Harry L. Repp is local manager.

The New Castle-O'Brien Woven Lath Co., New Castle, Ind., has been chartered under State laws to manufacture wire lath and kindred products. The incorporators are W. F. Wilkinson, Claude Byers and B. F. Netz, New Castle.

The Gulf States

BIRMINGHAM, Aug. 15.

The Peninsular Tire & Rubber Co., Tampa, Fla., recently incorporated with a capital of $1,000,000, has plans under way for a new two-story plant, 100 x 300 ft., for the manufacture of automobile tires. The initial works will have an output of about 300 tires per day, and will cost about $200,000, including equipment. A. H. Van Auken is general manager.

The Oldsmar Tractor Co., Oldsmar, Fla., is planning for an addition to its plant for the manufacture of oil heaters and heating equipment. It will be operated as a branch of the tractor works. H. J. Keller is vice-president and general manager.

The Humble Oil & Refining Co., Corpus Christi, Tex., is considering the erection of a new refinery in the vicinity of Benavides, Tex.

The Southern Railway Co., Charlotte, N. C., is planning to rebuild its coal tipple at Chamett, La. L. S. Lemond is chief engineer.

The Peninsula Ice & Cold Storage Co., Daytona Beach, Fla., recently organized, has plans under way for a new ice-manufacturing plant with initial output of about 30 tons per day. A new cold storage plant will also be constructed. Guy G. Bailey is president, and E. B. Parker, secretary and treasurer.

The Panhandle Brick & Tile Co., Amarillo, Tex., has been incorporated with a capital of $80,000, by W. C. Pope, H. B. Boyle and A. S. Stinnett, Amarillo, to manufacture brick, tile and kindred products.

The Chapman Carriage Works, Jacksonville, Fla., is having plans prepared for the construction of a three-story addition for the manufacture of automobile bodies and tops, estimated to cost about $100,000, with machinery. Marks & Shettall, Jacksonville, are architects. W. E. Sweney, 332 West Forsythe Street, is president.

Ernest Lynn, Hartsells, Ala., and associates, are planning the construction of a hydroelectric power plant in the vicinity of the Big Four Ranch, to cost about $100,000, including equipment.

The Kelsite Stone Products Co., 210 Seward Building, West Palm Beach, Fla., has had plans prepared for a factory to manufacture concrete building blocks, tile and kindred products. A list of machinery is being arranged, estimated to cost close to $15,000. H. G. Mitchell is president.

R. L. Spann, Dallas, Tex., has had plans prepared for a three-story machine and automobile service work, including department for equipment manufacture, estimated to cost about $85,000.

California

SAN FRANCISCO, Aug. 10.

The local market for machine tools is narrow and uninteresting. Business in new materials has been very small and is handicapped by the surplus of second-hand tools, to which most buyers are turning. Shop activities have also been curtailed, thereby reducing the demand for equipment.

The Tunison Motor Co., Thayer Building, Oakland, has plans under way for a new one-story, reinforced concrete factory, 150 x 450 ft., for the manufacture of automobiles and parts, estimated to cost about $250,000. It is proposed to begin construction early in the fall.

Reed Brothers, Inc., 91 Drumm Street, San Francisco, manufacturer of surgical instruments, rubber goods and similar products, has preliminary plans under way for a new branch factory at Irvington, Cal., estimated to cost about $100,000, with equipment. The first unit will be supplemented later by additions.

The California Gypsum Corporation, 731 Pacific Finance Building, Los Angeles, has preliminary plans under way for a new works at Coyote Wells, Imperial County, estimated to cost about $350,000 with equipment. A crushing plant with steam shovel and other machinery is estimated to cost approximately $100,000. A 16-mile narrow-gage railroad will also be constructed at an estimated cost of $200,000, including locomotive and rolling stock. R. W. Waterman is construction engineer.

The Pruden-Burr Unitsteel Construction Co., Douglas Building, Los Angeles, a subsidiary of the Metal Shelter Co., St. Paul, Minn., has preliminary plans under way for the establishment of a local plant for the manufacture of unit steel products for building construction.

The Severin Motor Co., Oakland, Cal., formerly located at Kansas City, Mo., is having plans prepared for a one-story, reinforced-concrete factory, 60 x 450 ft., for the manufacture of automobiles and parts. It is estimated to cost about $100,000. Maury I. Diggs, Easton Building, Oakland, is architect.

R. F. Angulo, Santa Barbara, Cal., manufacturer of building tile and kindred products, is considering plans for a new branch factory at Monterey, Cal.

The Los Angeles Street Railway Co., Pacific Electric Building, Los Angeles, will make extensions and improvements in its electric power plants and lines, to cost about $500,000.

The California Car Co., 496 Twelfth Street, Oakland, Cal., has leased the plant of the Enterprise Foundry Co., Richmond, Cal., for temporary works, pending the erection of its new plant at Oakland, plans for which are being prepared. The company manufactures automobile equipment and parts.

The T. H. Symington Co. has established a northwestern district with headquarters in St. Paul, Minn. J. F. Schurch, vice-president of the company and president of the Railway Supply Manufacturers' Association, who has been head of the company's Chicago office for several years, will have charge of the new district. In the Chicago office he will be succeeded by Le Roy Kramer, who has been elected a vice-president and director of the company. Mr. Kramer was for years identified with the operating department of the Frisco and Rock Island railroads and for six years was vice-president in charge of manufacturing for the Pullman Co. During the war he was Federal manager of the Frisco and the Missouri, Kansas & Texas railroads at St. Louis under the United States Railroad Administration. In the spring of 1919 he became vice-president in charge of production of the Willys-Overland plant at Toledo, and for a short time was vice-president of the Pierce-Arrow motor car plant at Buffalo.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

	Per Lb.
Bars:	
Refined bars, base price	2.78c.
Swedish bars, base price	12.00c.
Soft steel bars, base price	2.78c.
Hoops, base price	3.88c.
Bands, base price	3.43c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	2.88c.
Channels, angles and tees under 3 in. x ¼ in., base	2.78c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.75c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.95c.
Toe calk, ½ x ⅝ in. and larger	3.45c.
Cold-rolled strip, soft and quarter hard	10.00c. to 10.50c.
Open-hearth spring steel	4.25c. to 8.00c.
Shafting and Screw Stock:	
Rounds	4.38c. to 4.53c.
Squares, flats and hex	4.98c. to 5.03c.
Standard cast steel, base price	14.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.88c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.53c.
No. 12	3.58c.
No. 14	3.63c.
No. 16	3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.05c. to 4.30c.	.....
Nos. 22 and 24	4.10c. to 4.35c.	4.70c.
No. 26	4.15c. to 4.40c.	4.75c.
No. 28	4.25c. to 4.50c.	4.85c.
No. 30	4.50c. to 4.75c.	.....

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.10c. to 4.35c.
No. 16	4.25c. to 4.50c.
Nos. 18 and 20	4.40c. to 4.65c.
Nos. 22 and 24	4.55c. to 4.80c.
No. 26	4.70c. to 4.95c.
No. 27	4.85c. to 5.10c.
No. 28	5.00c. to 5.25c.
No. 30	5.50c. to 5.75c.

No. 28, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Blk.	Galv.	*Wrought Iron*	Blk.	Galv.
½ in. Butt..	—48	—32	¾ in. Butt....	—22	—4
¾ in. Butt..	—54	—39	1-1½ in. Butt.	—24	—6
1-3 in. Butt..	—56	—42	2 in. Lap.....	—14	—1
3½-6 in. Lap.	—51	—37	2½-6 in. Lap.	—22	—6
7-12 in. Lap..	—43	—27	7-12 in. Lap...	— 7	+4

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	4.25c. to 4.50c.
Annealed soft	4.25c. to 4.50c.
Galvanized annealed	5.00c. to 5.25c.
Coppered basic	4.75c. to 5.00c.
Tinned soft Bessemer	6.25c. to 6.50c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	15¾c. to 18¾c.
High brass wire	16¾c. to 21¼c.
Brass rod	13¾c. to 20¼c.
Brass tube, brazed	27 c. to 31 c.
Brass tube, seamless	18½c. to 20 c.
Copper tube, seamless	20 c. to 22¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20c. to 23c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin Grade "AAA" Charcoal 14x20	Bright Tin Grade "A" Charcoal 14x20	Coke—14x20	Primes	Wasters
		80 lb....	$6.80	$6.55
		90 lb....	6.90	6.65
		100 lb....	7.00	6.75
IC.. $10.60	$9.50	IC...	7.20	6.95
IX.. 11.80	10.75	IX...	8.10	7.85
IXX.. 13.60	12.25	IXX...	9.10	8.85
IXXX.. 15.60	14.25	IXXX...	10.50	10.25
IXXXX.. 17.20	16.00	IXXXX...	11.50	11.25

Terne Plates

8-lb. Coating 14 x 20

100 lb.	$7.50
IC	7.75
IX	8.00
Fire door stock*	11.00

Tin

Straits pig	30c.
Bar	37c. to 38c.

Copper

Lake ingot	15c.
Electrolytic	15c.
Casting	15c.

Spelter and Sheet Zinc

Western spelter	6¼c. to 6¼c.
Sheet zinc, No. 9 base, casks	11½c. open 12c.

Lead and Solder*

American pig lead	5¼c.
Bar lead	6¼c. to 6¾c.
Solder, ½ and ½ guaranteed	20¼c.
No. 1 solder	18¼c.
Refined solder	15¾c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	30c.

Antimony

Asiatic	6½c. to 7c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	30c. to 32c.

Old Metals

The market is quiet but there is a little better feeling regarding the future. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	9.75
Copper, heavy and wire	9.00
Copper, light and bottoms	7.50
Brass, heavy	4.50
Brass, light	3.75
Heavy machine composition	7.00
No. 1 yellow brass turnings	4.00
No. 1 red brass or composition turnings	6.25
Lead, heavy	3.50
Lead, tea	2.50
Zinc	2.00

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